

# POPULAR SCIENCE

MONTHLY  
MECHANICS AND HANDICRAFT



Push-Button Awnings  
PAGE 176

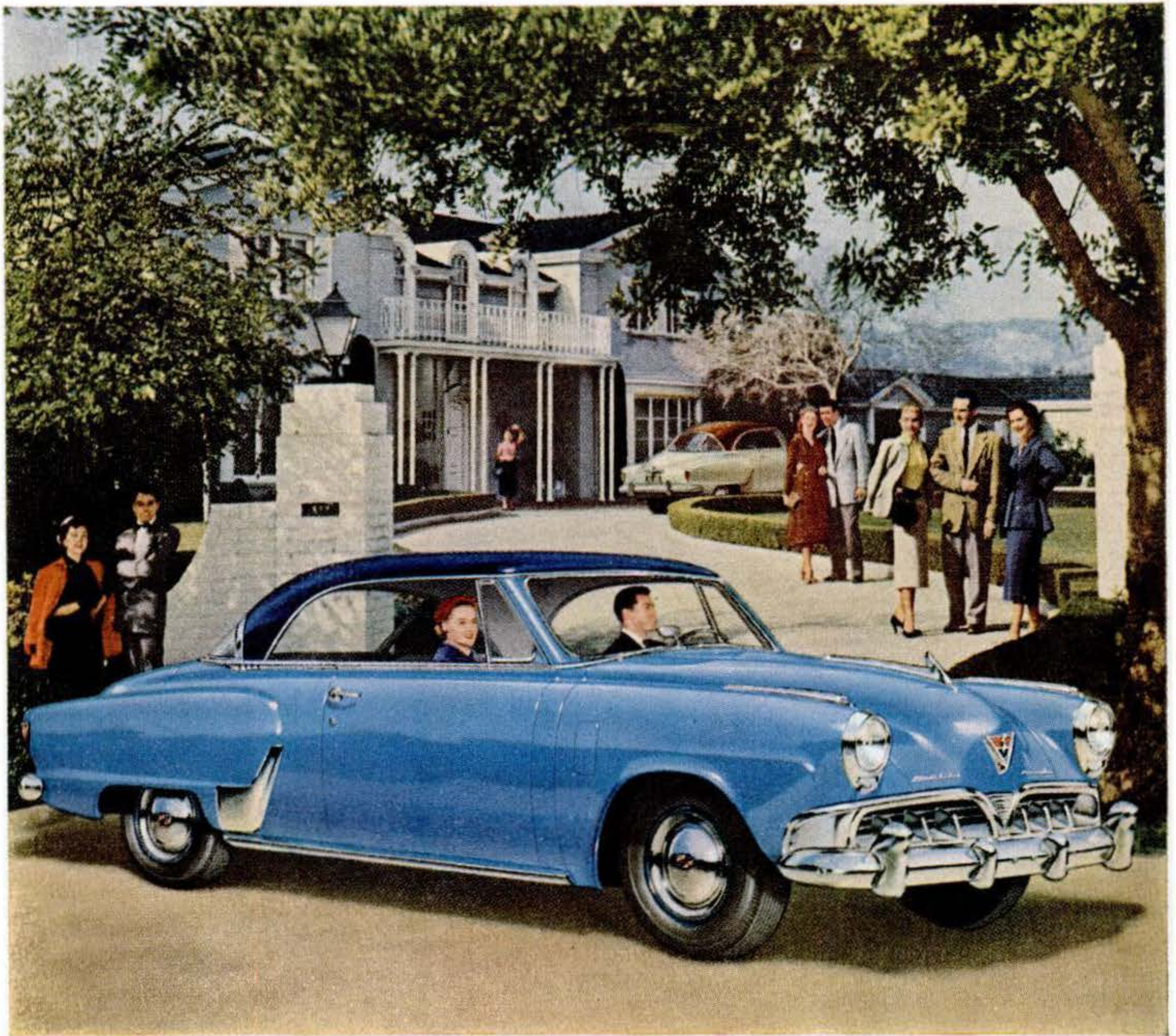
25¢ June



How TV Will  
Take You to  
Conventions

PAGE 136

WILBUR SHAW HAILS OLDSMOBILE'S 'MAGIC LIGHTS' PAGE 89



Commander V-8 Starliner "hard-top" convertible.

Chrome wheel discs optional at extra cost—decorative and other specifications subject to change without notice.

## See and drive the newest of the new

LOOK at the sweeping grace of line of this exciting Studebaker Starliner. Wouldn't you love to be going places in it right now?

Like a sleek, new-type jet plane, every 1952 Studebaker is free from burdensome excess bulk—and this saves gallon after gallon of gasoline for you.

The Starliner is one of many dramatically advanced 1952 Studebaker Champions and Commander V-8s.

Stop in and arrange to try one out at a nearby Studebaker dealer's showroom.



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An Amazing New  
Gem Discovery!

Looks Exactly Like  
a Diamond. Only  
an Expert Can Tell  
The Difference.

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### Wear a Full Carat! Pay Far Less Than For a Diamond

Titania Gems cost far, far less than a diamond, even though they look the same and are more brilliant. You can buy one of these full carat or 2 carat Titania Gem rings from Titania Jewelers, Inc., and still pay less than you would for a small 1/8 carat diamond ring. Choose the style you like from the rings shown here, and PAY ONLY ONE DOLLAR DOWN. Prices and easy terms are shown under each picture.

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These superbly beautiful Titania Gem rings are all 14 Karat gold and fully guaranteed. If you are not completely satisfied after you have seen and examined your ring, simply return it in 10 days, and the \$1 down payment will be promptly refunded to you.

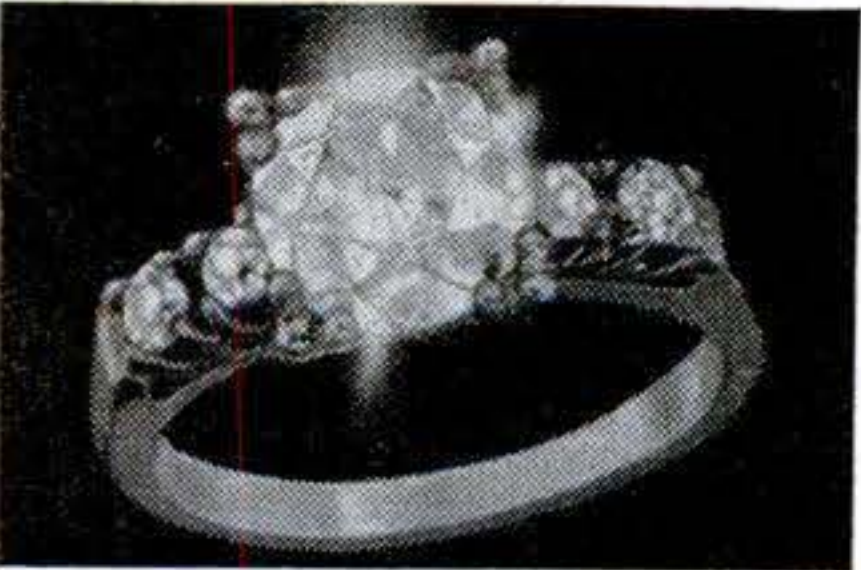
Fill out and mail today the handy Order Blank below. Send only One Dollar, and pay the balance in easy monthly payments.

### If You Do Not Know Ring Size

Cut cardboard 5 inches long as shown at right. Slip ring that fits over narrow end and mark with pencil at both sides of ring where it stops... OR wrap ring size guide at bottom of coupon around finger. Mark with pencil or cut off where arrow meets on paper SEND WITH ORDER.



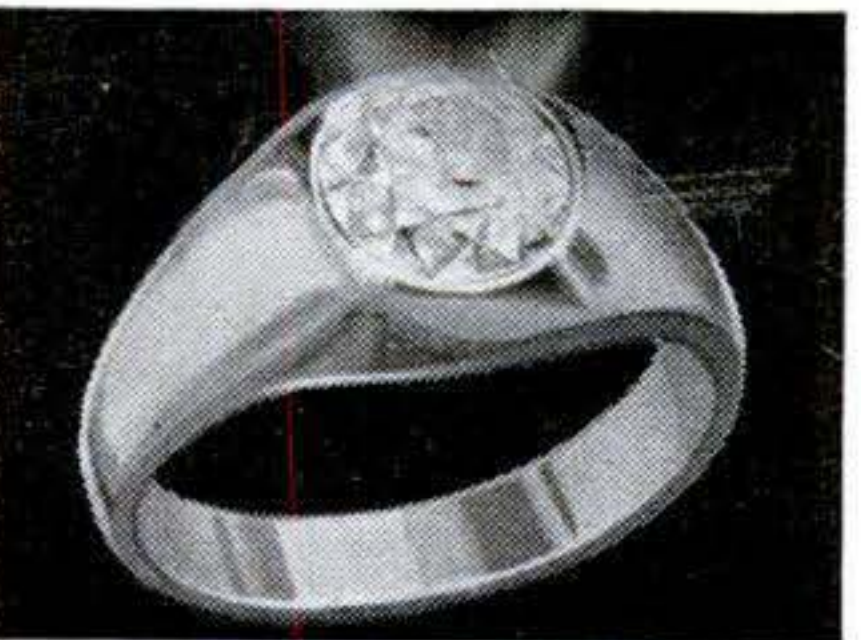
**A. Ladies' Solitaire**  
(White or Yellow Gold)  
1 carat, \$49 tax included  
\$1 Down, \$4 per mo. for 12 mos.  
2 carat, \$79 tax included  
\$1 Down, \$6 per mo. for 13 mos.



**B. Ladies' Center Gem with 4 Side Gems**  
(White or Yellow Gold)  
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\$1 Down, \$6 per mo. for 16 mos.  
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\$1 Down, \$6 per mo. for 21 mos.



**C. Man's Square Set Ring**  
(White or Yellow Gold)  
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\$1 Down, \$6 per mo. for 16 mos.



**D. Man's Gypsy Ring**  
(White or Yellow Gold)  
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\$1 Down, \$5 per mo. for 13 mos.  
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\$1 Down, \$6 per mo. for 16 mos.

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Please send me the Titania ring I have checked below, full price \$..... Enclosed find \$1 down payment, and I promise to pay the balance at the rate of \$..... per month for ..... months (as stated under picture.) I have indicated my choice of white or yellow gold and ring size desired. I am giving you below the names of two credit references for your files. I understand that I can return the ring within 10 days for full refund if I am not satisfied.

Ladies' Style A <input type="checkbox"/>	Man's Style C <input type="checkbox"/>	White Gold <input type="checkbox"/>
Ladies' Style B <input type="checkbox"/>	Man's Style D <input type="checkbox"/>	Yellow Gold <input type="checkbox"/>
1 Carat <input type="checkbox"/>	1 Carat <input type="checkbox"/>	Ring Size ....
2 Carat <input type="checkbox"/>	2 Carat <input type="checkbox"/>	

### CREDIT REFERENCES

YOUR NAME.....

Name.....

ADDRESS.....

Address.....

CITY..... STATE.....

Name.....

Address.....

RING MEASURING STRIP—CUT OUT

If you do not know your ring size and you do not use cardboard method shown above—then cut out ring measuring strip to right.—wrap around your ring finger—cut off or mark with pencil where it meets. SEND WITH ORDER.

# America's Leading New-Idea Magazine for 80 Years

Founded 1872, Vol. 160: No. 6

**POPULAR  
SCIENCE**

REG. U. S. PAT. OFF. Monthly

Mechanics and Handicraft

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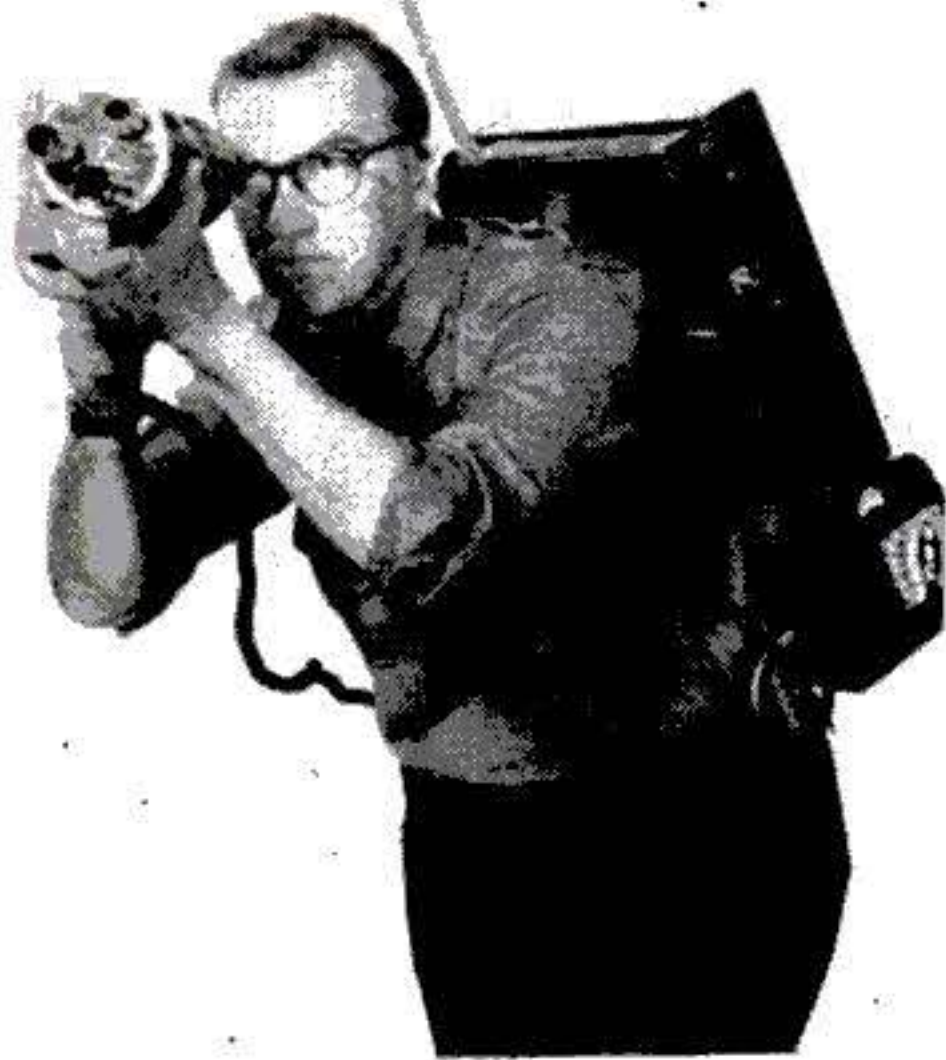
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*This Month's  
Big Features:*



*That's TV-star Dave Garroway on the cover, demonstrating a new walkie-talkie-lookie—one of many TV cameras that will enable you to see a President nominated next month. Garroway will be an NBC commentator there. For the full story, turn to page 136.*

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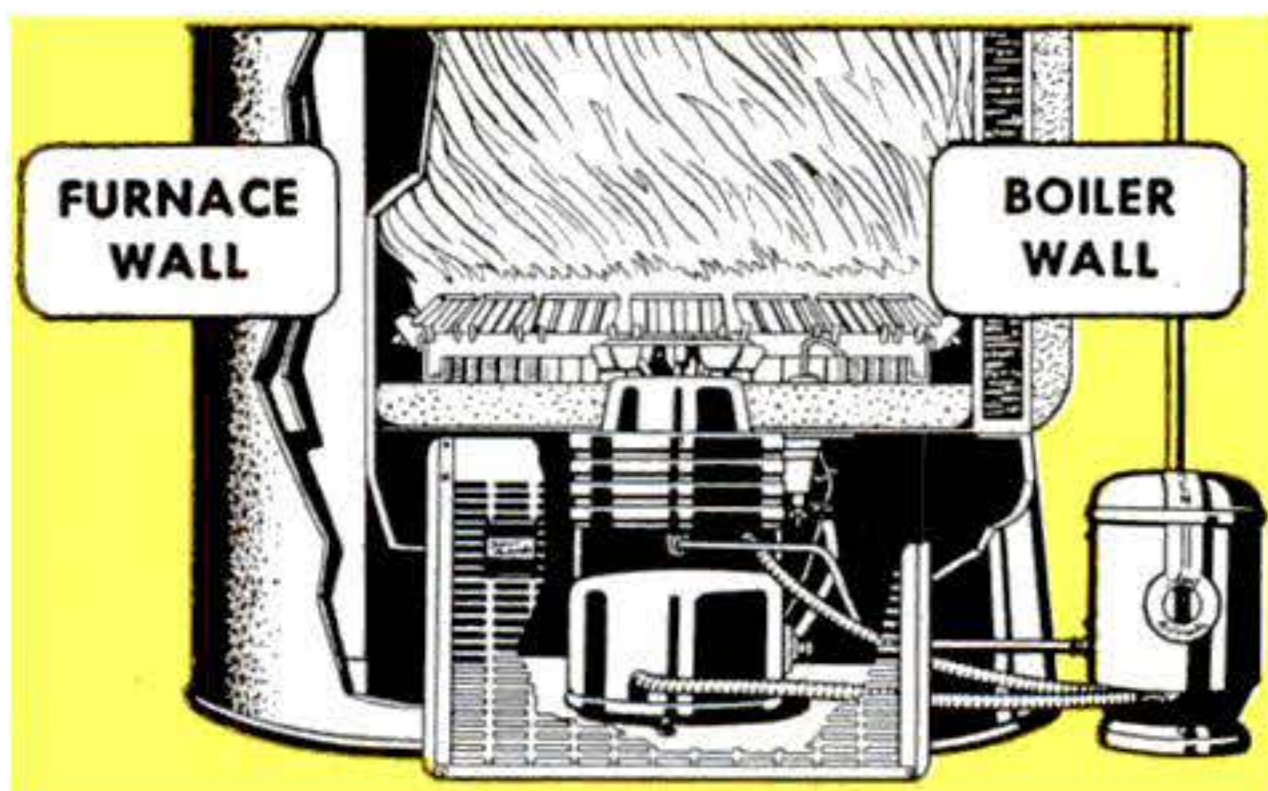
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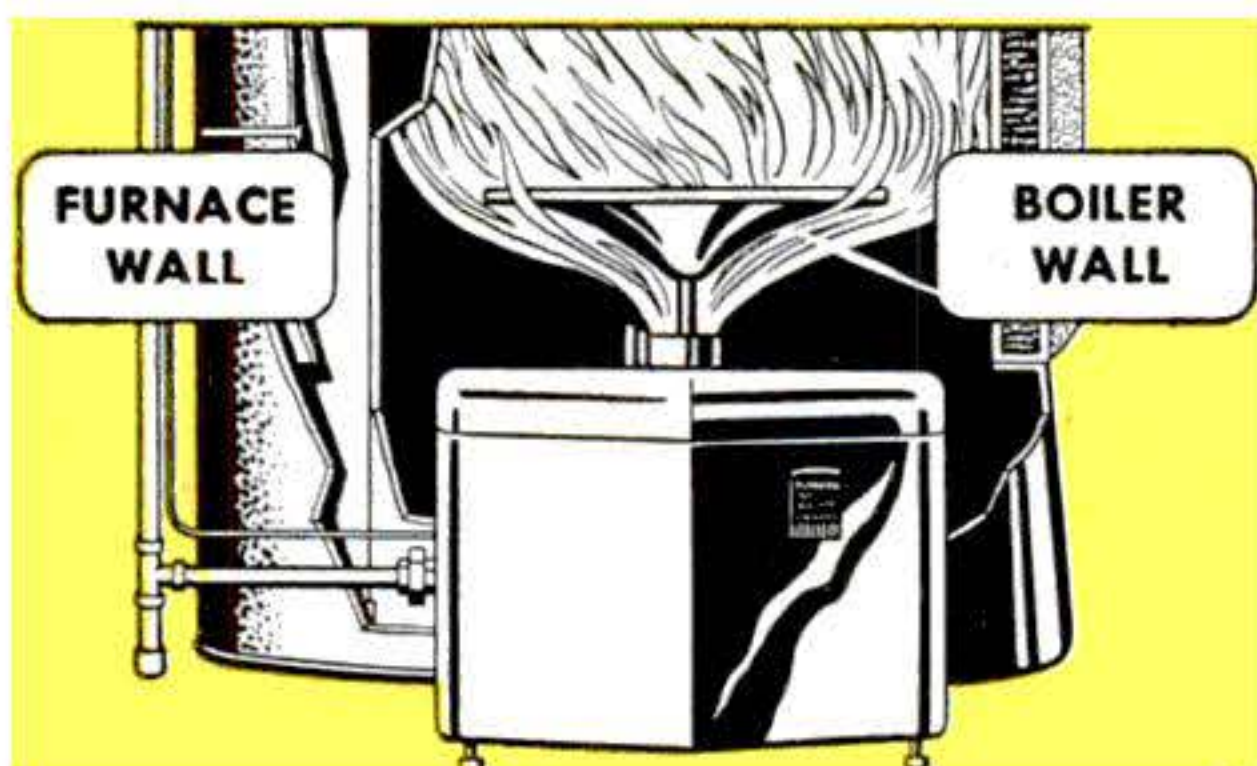
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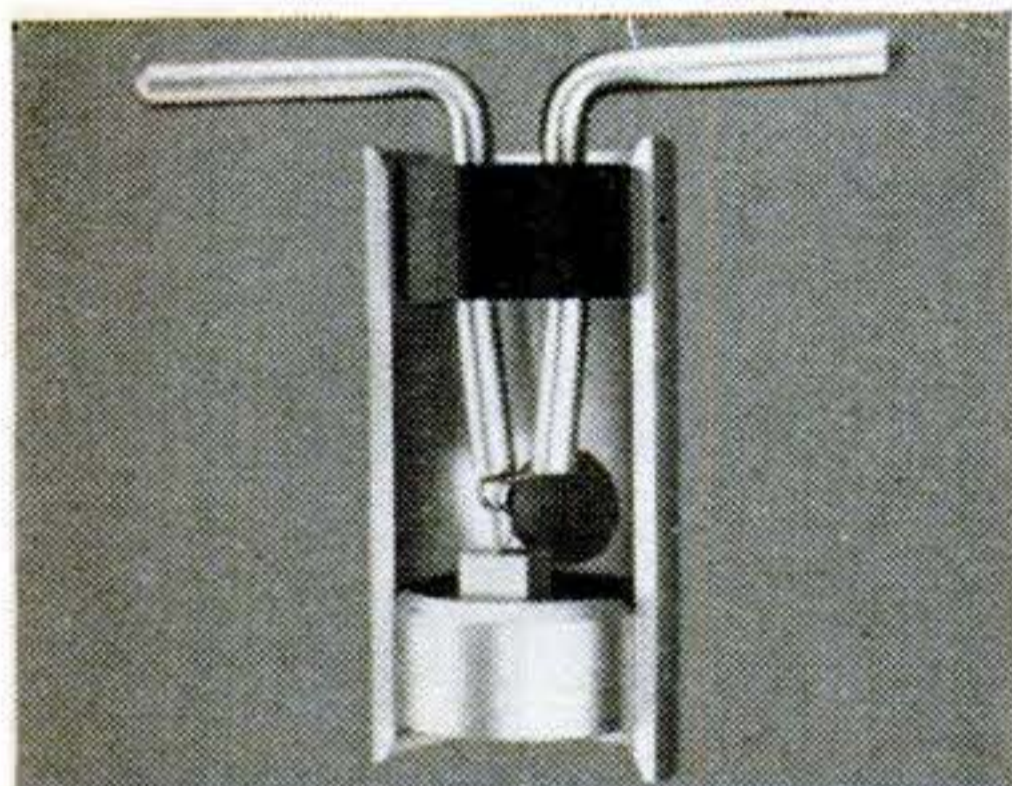
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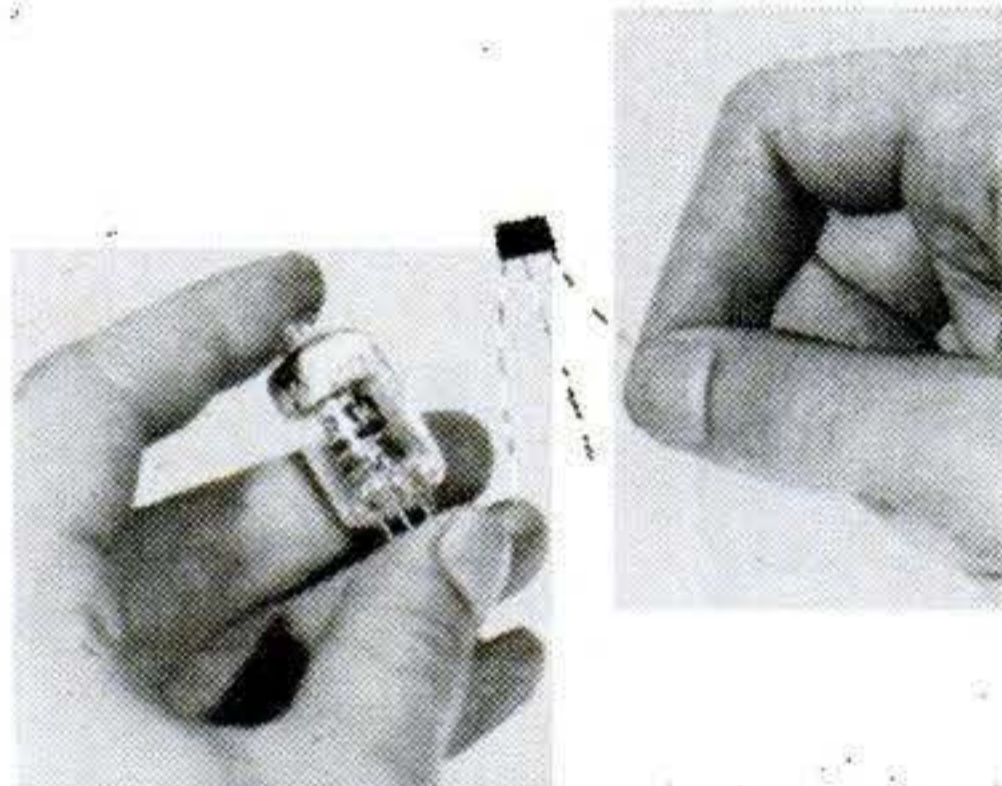
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# THE TRANSISTOR

## A picture report of progress



**FIRST TRANSISTORS** were of this point contact type (picture about twice life size). Current is amplified as it flows between wires through a wafer of germanium metal. These transistors are now being made at the Allentown plant of Western Electric, manufacturing unit of the Bell System. They will be used in a new selector which finds the best routes for calls in Long Distance dialing.



**NEW JUNCTION TRANSISTORS**, still experimental, also use germanium but have no point contacts. Current is amplified as it flows through germanium "sandwich"—an electron-poor layer of the metal between two electron-rich ends. This new transistor runs on as little as *one-millionth* of the power of small vacuum tubes.



**MUCH HAD TO BE LEARNED**, especially about the surface of germanium and the effect of one part in a million of alloying materials. Transistors promise many uses—as amplifiers, oscillators, modulators . . . for Local and Long Distance switching . . . to count electrical pulses.



**ASSEMBLY PROBLEMS**, such as fixing hair-thin wires to barely visible germanium wafers, are solved by new tools and mechanized techniques. Finished transistors withstand great vibration and shock. Engineers see many opportunities for these rugged devices in national defense.



**MOIST PAPER AND COIN** generate enough current to drive audio oscillator using junction transistors. Half as big as a penny matchbox, an experimental two-stage transistor amplifier does the work of miniature-tube amplifiers ten times larger.

**A** tiny amplifying device first announced by Bell Telephone Laboratories in 1948 is about to appear as a versatile element in telephony.

Each step in the work on the transistor . . . from original theory to initial production technique . . . has been carried on within the Laboratories. Thus, Bell scientists demonstrate again how their skills in many fields, from theoretical physics to production engineering, help improve telephone service.

## BELL TELEPHONE LABORATORIES

*Improving telephone service for America provides careers for creative men in scientific and technical fields.*



# A TRUE I. C. S. STORY

taken from an actual letter



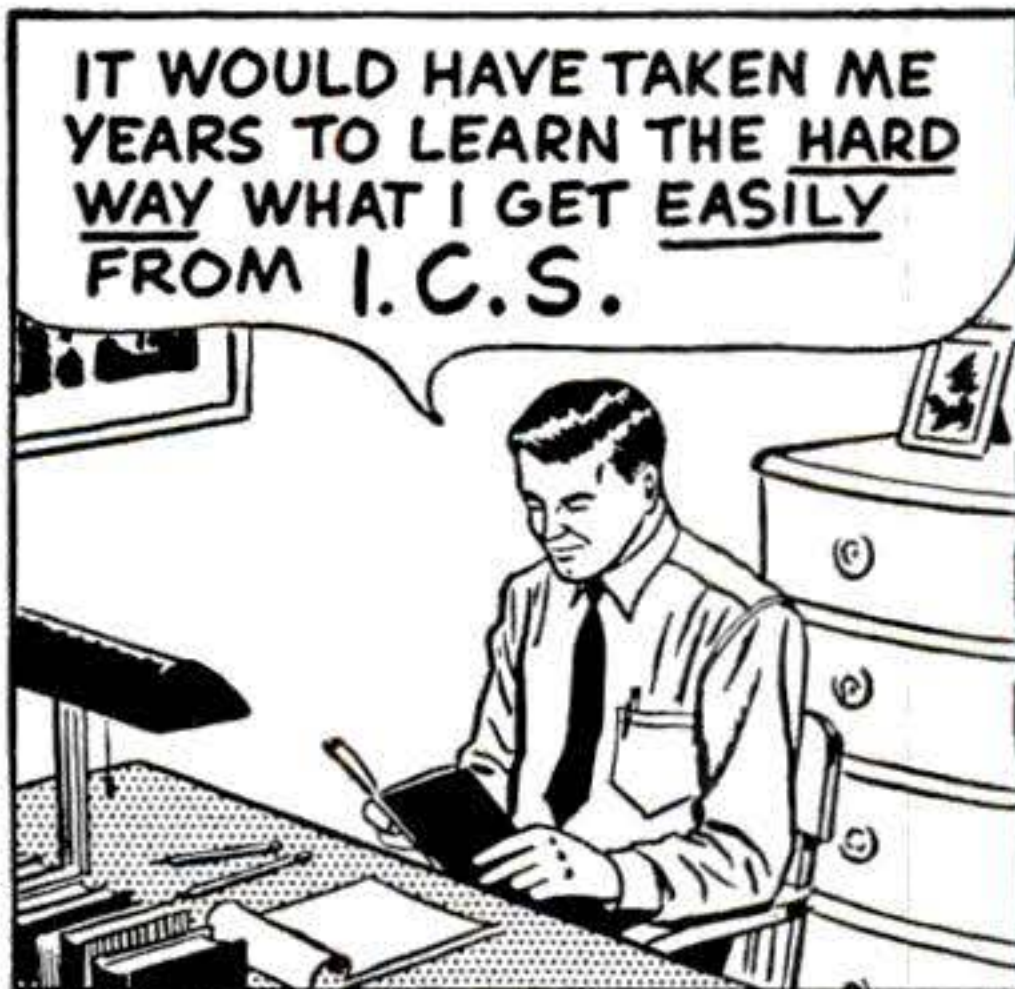
I was a World War II pilot ...



A prisoner of war in Germany ...



Back home, I was hired by National ...



Studied with I. C. S. in my spare time ...



I. C. S. sent reports to my employer ...



I am now Washington District Manager.

*Parke Wright*  
PARKE WRIGHT

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|---|---|--|--|

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City \_\_\_\_\_ State \_\_\_\_\_ Working Hours \_\_\_\_\_ A.M. to \_\_\_\_\_ P.M.

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## NEXT MONTH . . . Home-Workshop Index



Every Mechanics and Handicraft story published in the last year will be indexed and cross-indexed, alphabetically and by subject, in next month's PSM. Feature articles will appear in bold-face type. If, like most readers you save back copies, this new index will help you get more out of your files.



**MR. TV OWNER!**

# Stop TV Interference At Once And Stop It—For Good!

**An amazing no-risk challenge to every set owner who is tired of paying \$5-\$10-\$15 for THE SAME TV REPAIRS . . . OVER AND OVER AGAIN!**

**D**o you know that 95% of the wavy lines, streaks, zags, distortions, picture roll, flutters, and snow that ruins your TV viewing are not caused by your set at all? That they cannot be eliminated by your repairman, no matter how good he is! That they cannot be prevented by your antenna, no matter how powerful it is!

Yes, 95% of your costly television troubles are caused by electronic TV interference from the outside. And the only way to permanently remove that interference is to **BLOCK IT OUT**, before it even reaches your set—in exactly the same way sunlight glare is blocked out by sun glasses, before it reaches your eyes.

This is exactly what a revolutionary new TV invention—the **TELERON TV WAVE TRAP** (Pat. Pend.)—does for your set. This amazing "Interference Eliminator" actually eliminates the 6 most aggravating forms of interference, before they can reach your set. It actually strengthens your reception on all channels—even in poor reception areas.

**WHICH OF THESE 6 TV HEADACHES DO YOU WANT TO REMOVE FOR GOOD?**

**WAVY LINES** — Caused by airplane flying as much as 15 miles away from your home. Mr. Oscar Holden of New York City writes: "My TELERON WAVE TRAP eliminates 95% of all wavy lines within 15 minutes after I clipped it on my set."



**DISTORTION**—Caused by outside telephone lines up to 11 miles away from your home . . . or by other neighborhood TV sets and antennas that compete with your set for the same channel.



**TELERON WAVE TRAP** eliminates 93% of all this interference **BEFORE IT REACHES YOUR SET.**



**S N O W** — Caused by constantly running electrical appliances in your home — such as refrigerators and oil burners. Mr. M. CAINE of Chicago, Ill. reports: "I live in a big apartment house where there's plenty of electrical interference. But since I clipped a **TELERON WAVE TRAP** on my set I haven't been bothered once by snow."



**BORER EFFECT** — Caused by doctor's diathermy machine—or amateur radio operator as much as 3 miles away from your home. Mr. WILLIAM BENTLEY of Los Angeles writes: "My family couldn't go through a night of TV viewing without getting terrific TV interference from a hospital about 2 miles away. Then I heard about the **TELERON WAVE TRAP**. I tried it. And now, 6 months later I have only been bothered once by those diathermy machines in that hospital."



**STREAKS** — Caused by car ignitions, trucks or busses up to 2½ miles away from your home . . . or by neon signs, doorbells, electric toasters, broilers, radios and phonographs within 1 mile of your home. **TELERON WAVE TRAP** eliminates 98% of all this in-

terference **BEFORE IT REACHES YOUR SET.**



**TV STATIC**—Caused by atmospheric conditions up to 5 full miles away from your home. **TELERON WAVE TRAP** eliminates 95% of all this irritating interference **BEFORE IT REACHES YOUR SET.**

**MOVIE-CLEAR RECEPTION 365 DAYS A YEAR!**

Send for your **TELERON WAVE TRAP** today. Send no money. When your **TELERON WAVE TRAP** arrives simply clip it on the back of your set. It takes only 30 seconds — you need no special tools, no training. And it fits every set made since 1947—no matter what the brand, style or year. See for yourself how this amazing invention gives you sharp, clear pictures. How it adds new life to your picture even in fringe areas—even in weak reception zones—even on channels you could hardly pick up before.

**HERE'S PROOF—TEST IT IN YOUR OWN HOME! AT OUR RISK!**

If you order your **TELERON TV WAVE TRAP** today, you do not pay the \$5 that 50,000 other TV owners paid—you deposit only \$2.98 with the postman. If after you clip this amazing **TELERON WAVE TRAP** on your set, you are not getting perfect movie-clear reception—please return for full money back! *You try it at our risk—you do not buy it until you are 100% satisfied.* **ORDER TODAY AND SAVE \$2!**

**ORDER TODAY AND SAVE \$2! MAIL COUPON NOW!**

**TELERON TV WAVE TRAP**, Dept. WA, 699 Madison Ave., N. Y. Please send me the TV WAVE TRAP immediately, at \$2.98, plus C.O.D. postage. I understand that satisfaction is guaranteed 100%.

Name.....

(Please Print)

Address.....

City..... Zone..... State.....

Cash  Check  Money Order. **SAVE MORE!** Send \$3.00 with coupon. We pay all postage charges. Same Money-Back Guarantee.

# The Mechanism of Mind



**WHY YOU ARE AS YOU ARE—**

*and What You Can Do About It!*

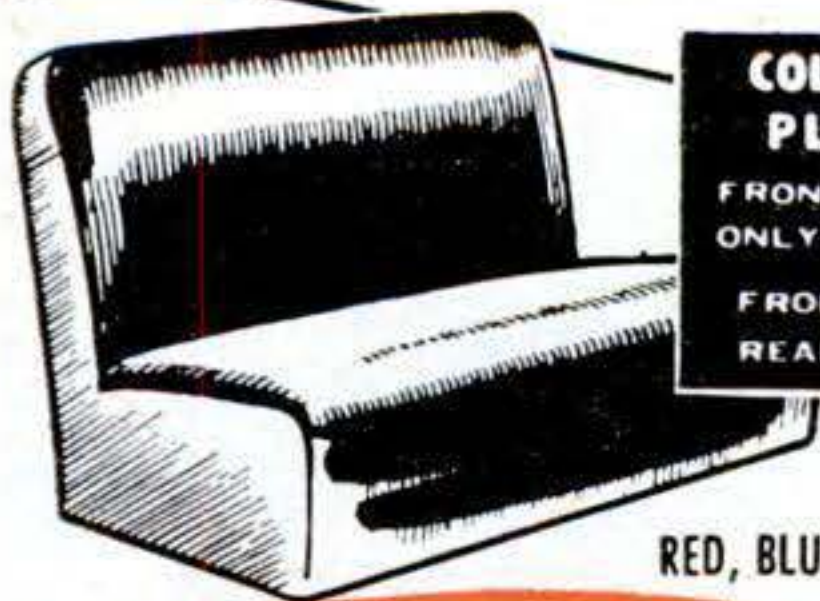
**D**ID you ever stop to think *why* you do the things you do? Have you often—when alone—censored yourself for impulsive urges, for things said or done that did not truly represent *your real thoughts*, and which placed you at a disadvantage? Most persons are *creatures of sensation*—they react to instinctive, impelling influences which surge up within them and which they do not understand—*or know how to control*. Just as simple living things involuntarily withdraw from irritations, so likewise thousands of men and women are content to be motivated by their undirected thoughts which haphazardly rise up in their consciousness. *Today you must sell yourself* to others—bring forth your best abilities, manifest your personality, if you wish to hold a position,

make friends, or impress others with your capabilities. You must learn how to draw upon your latent talents and powers, not be bent like a reed in the wind. There are simple, natural laws and principles which—if you understand them—make all this possible.

For centuries the Rosicrucians (not a religious organization), a worldwide movement of men and women devoted to the study of life and its hidden processes, have shown thousands how to probe these mysteries of self. Renowned philosophers and scientists have been Rosicrucians—today men and women in every walk of life owe their confidence and ability to solve personal problems to the Rosicrucian private, *sensible* method of self-development. Send today for a copy of the book, "The Mastery of Life," which will be sent to you without obligation. It will tell you of the Rosicrucians *and what they can do for you*. Address: Scribe G. J. X.

**THE ROSICRUCIANS (AMORC), SAN JOSE, CALIFORNIA, U. S. A.**

# AUTO SEAT COVER BARGAINS!



**COLORFUL PLASTIC**  
FRONT ONLY \$1.98  
FRONT AND REAR \$3.89

RED, BLUE or GREEN



**"SCOTCH" PLAIDS**  
FRONT ONLY \$2.98  
FRONT AND REAR \$5

WHAT A BUY!

Free!  
10 DAY TRIAL

Now at last you can have smart seat covers that will protect your upholstery and add distinction to your car at amazingly low cost. These remarkable seat covers are tailored of miracle plastic in rich, lustrous colors. New snap-on action hold them tight. FITS ALL CARS. Colorfast. Will not fade . . . will not shrink. Waterproof, stainproof, greaseproof. Resists burns. Cleans easily with damp cloth.

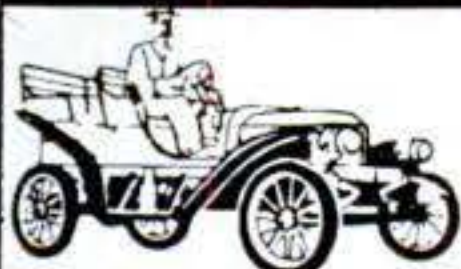


Lifelike **ZEBRA**  
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FRONT AND REAR \$6



Simulated **LEOPARD**  
FRONT ONLY \$2.98  
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## BUILD Old Time Scale Model CARS



1909 Stanley Steamer



Model "T" Ford



Model "A" Ford



1900 Packard

- Amazing
- Realistic



1903 Cadillac

Special offer only **99¢** ea.  
all 5 models \$3.95 just . . .

AUTHENTIC REPLICAS OF PIONEER AUTOMOBILES in realistic detail that makes history come alive. Complete kits include all prefabricated parts . . . lamps,

horn, wheels, body sections, etc. in accurate 3/8" scale. So easy to assemble, a child can do it . . . so fascinating a hobby you'll want all 5 cars right away. Use them to make unique book-ends, table lamps, desk sets, wall decorations. Complete assembly instructions and plans in each kit. Start your collection now, while low price is in effect.

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Just send name, address, items wanted. We ship C.O.D. plus postage. Or send cash, check, money order . . . we pay postage. ORDER AT OUR RISK. Money back if not delighted.

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Perfect for room to room, house to garage, etc. No batteries, no tubes. COMPLETE 2-WAY TELEPHONE SYSTEM works at amazingly long distances. Handy pocket size. Electronic voice powered. NO LICENSE OR PERMIT NEEDED. Not war surplus . . . brand new. Two complete units ready to use. Quantity limited. Order today.

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- It Tells Date

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Measures Speed • Measures Distance • Records Up to 12 Hours • OVER 40 QUALITY FEATURES.

Precision Jeweled. Imported Swiss Movement. Accurate. Dependable. Push-Button Stop and Start. Red Sweep-Second Hand. Unbreakable Crystal Triple Chrome Plated Case. Shock Resistant. Nite-Vue Radium Glow Dial. Anti-Magnetic. Times Shop work. Times Photography. Times Sports. Times Races. Times Lab. work.

Times Planes. Expansion Band Included.



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## New... Guaranteed WRIST WATCH with Jeweled COMPASS

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- TELLS TIME

Special! Introductory Offer  
COMPARE AT \$25 ANYWHERE! \$7.95 Plus 80c Fed. Tax

The most practical watch ever devised for OUTDOOR MEN! Guaranteed accurate timekeeper with a dependable compass right on the dial. Check your direction at a glance. Features gleaming chrome-plated case, non-shatter crystal and embossed genuine leather strap. Ruggedly built for rough outdoor treatment! Order today while this introductory low price lasts.

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DEPT. 424

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**Shine your car the easy way  
...have more leisure time for play!**

SAVE TIME—CLEAN AND POLISH YOUR CAR IN ONE EASY OPERATION WITH ECONOMICAL DU PONT NO. "7"\* POLISH. Watch dirt film disappear... watch the brilliant shine come out on your car when you use Du Pont No. "7" Polish.

No. "7" Polish does both jobs at once—cleans and polishes—with *much less rubbing!* That's because it contains "methyl cellulose," the exclusive "stroke-saving" ingredient found only in Du Pont's patented formula.

You'll find No. "7" Polish makes polishing so much faster and easier, you'll have more time and energy left to enjoy your car.

\*REG. U. S. PAT. OFF.

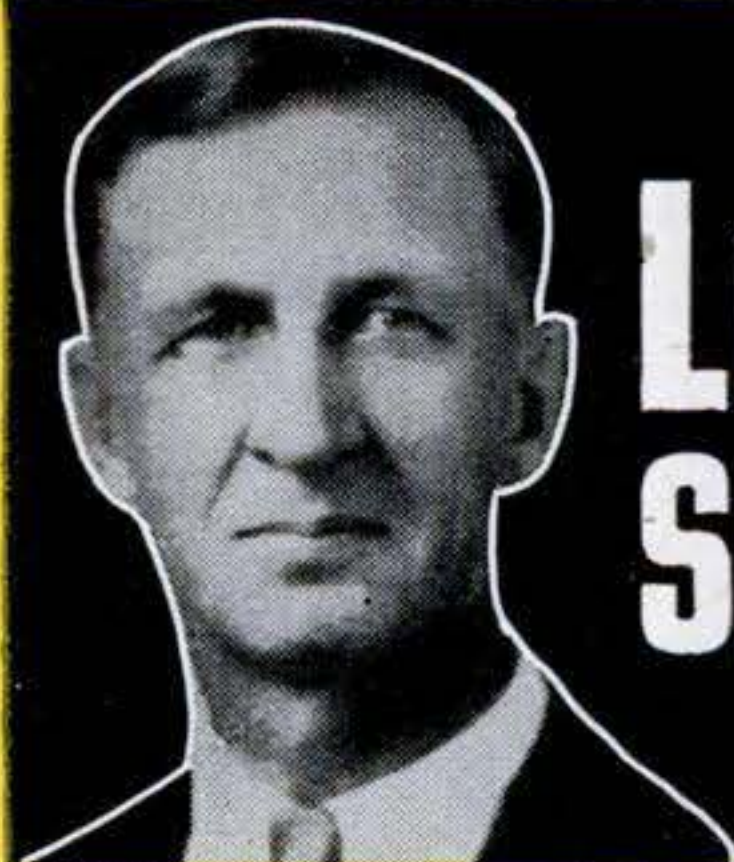
Patented Du Pont formula contains methyl cellulose—polishes faster with less rubbing



**DU PONT NO. "7" POLISH**

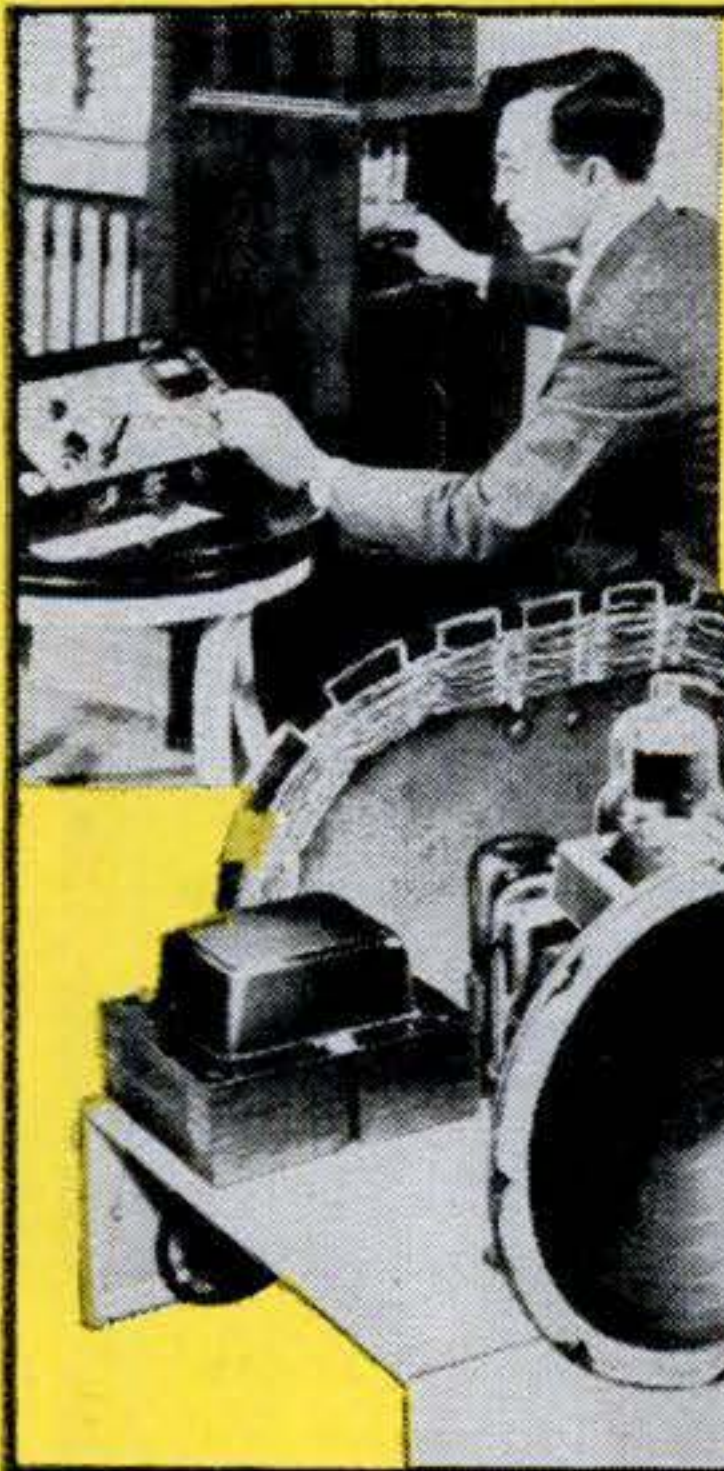
BETTER THINGS FOR BETTER LIVING... THROUGH CHEMISTRY

*I Will Show You How to*  
**LEARN RADIO-TELEVISION**  
**SERVICING OR COMMUNICATIONS**  
*by Practicing in Spare Time*



**YOU PRACTICE RADIO  
SERVICING**

You build the modern Radio shown below as part of my Servicing Course. I send you speaker, tubes, chassis, transformer, loop antenna, everything you see pictured and **EVERYTHING** you need to build this modern Radio Receiver. Use it to make many tests, get practical experience.



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COMMUNICATIONS**

I send you all the parts to build Transmitter shown below as part of my new Communications Course. Conduct actual procedure of Broadcast Operators, practice interesting experiments, learn how to actually put a transmitter on the air.



**EXTRA PAY IN  
ARMY, NAVY,  
AIR FORCE**  
 Knowing Radio, TV, Electronics can help you get extra rank, extra prestige, more interesting duty at pay up to several times a private's base pay. You are also prepared for good Radio-TV jobs upon leaving service. Mail coupon TODAY.

**NEW**

**I TRAINED THESE MEN**

"After graduating, worked for servicing shop. Now Chief Engineer of three Police Radio Stations."—S. W. DINWIDDIE, Jacksonville, Illinois.



"While learning, made \$5 to \$10 a week in spare time. Now have a profitable spare time shop."—L. ARNOLD, Pontiac, Mich.



"I accepted a position as Radio and Television Technician . . . was promoted to manager of Television Service and Installation."—L. HAUGER, San Bruno, California.



"Have my own shop. Am authorized serviceman for five manufacturers and do servicing for 7 dealers."—P. MILLER, Maumee, O.



"Four years ago, a bookkeeper on a hand-to-mouth salary, am now a Radio Engineer ABC network."—N. H. WARD, Ridgefield, Park, New Jersey



"When I enrolled, had no idea it would be so easy to learn. Have equipped my shop out of spare time earnings. I am clearing about \$40 to \$60 a month."—J. D. KNIGHT, Denison, Tex.



**I Will Train You at Home  
with MANY KITS OF PARTS I SEND**

Do you want good pay, a job with a bright future and security? Would you like a profitable shop of your own? The fast growing, prosperous RADIO-TELEVISION industry is making these opportunities for you. Radio alone is bigger than ever. 90 million home and auto Radios, 3100 Broadcasting Stations, expanding use of Aviation and Police Radio, Micro-Wave Relay, Two-Way Radio for buses, taxis, etc., are making opportunities for Servicing and Communications Technicians and FCC-Licensed Operators.

**Television is TODAY'S Good Job Maker**

In 1946 only 6,000 TV sets sold. In 1950 over 5,000,000. By 1954, 25,000,000 TV sets will be in use, according to estimates. Over 100 TV Stations are operating in 35 states. Authorities predict there will be 1,000 TV Stations. This means new jobs, more jobs, good pay for qualified men.

**Many Soon Make \$10 A Week Extra in Spare Time**

Keep your job while training at home. Hundreds I've trained are successful RADIO-TELEVISION TECHNICIANS. Learn Radio-Television principles from illustrated lessons. Get PRACTICAL EXPERIENCE experimenting with circuits common to Radio and Television. Many students make \$5, \$10 a week extra fixing neighbors' Radios in spare time. Special Booklets start teaching you the day you enroll.

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Send for my FREE DOUBLE OFFER. Get actual Servicing lesson. Also get my 64-page book, "How to Be a Success in Radio-Television." Read what my graduates are doing, earning. Send coupon in envelope or paste on postal. J. E. SMITH, President, Dept. 2FB, National Radio Institute, Washington 9, D. C. OUR 39TH YEAR.

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 New, special TV kits furnished to build high-definition SCOPE . . . RF OSCILLATOR with flyback power supply . . . complete TV set . . . many other units. You see pulse, trapezoidal, saw-tooth wave forms. Get valuable PRACTICAL EXPERIENCE locating and correcting TV troubles. Mail coupon for facts, pictures and prices!

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Success  
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# Letters



## Everybody Wants to Drive a Truck

We thought you would be interested to know that your article "How a Champ Drives a Truck" [Jan. '52, p. 156] has drawn more than 700 requests for copies of our booklet "Things a Professional Truck Driver Should Know."

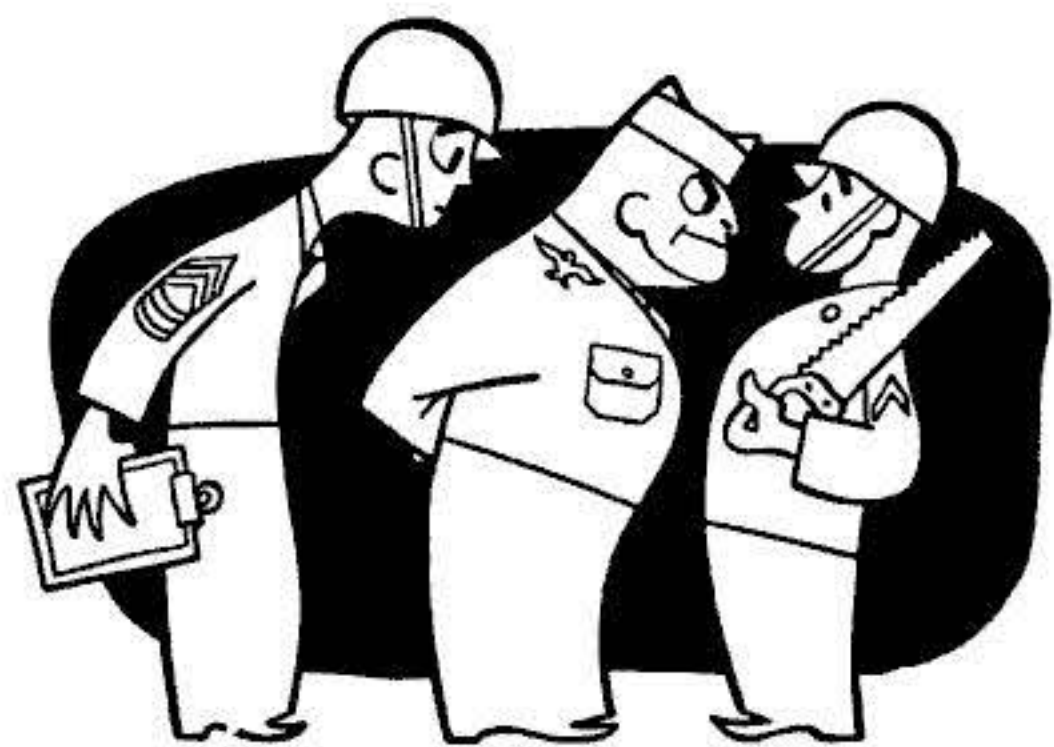
The requests have come from all sorts of people, including school children, soldiers in Korea, men in prison, safety instructors and many truck drivers.

ROBERT J. TEST  
American Trucking Associations  
Washington, D. C.

## Craftwork Makes Crafty Soldiers

I wish to compliment you on your initiative in establishing the "Craftsmen in Uniform" feature beginning with your April issue.

Our craft program is too often looked upon solely as a pastime activity, which, of course, it is and as such serves a purpose. However, its real value is in teaching men to use their hands and exercise their ingenuity in making original projects rather than in following patterns alone.



I look for no contradiction from officers who have had command of troops in the field, especially under combat conditions, in making the statement that the men who can use their hands are the most useful soldiers under those conditions. They make emergency repairs out of whatever is at hand, and their ingenuity in rigging up little camp conveniences out of scrap is often astonishing.

MARSHALL GRAVATT  
Director Arts and Crafts  
Headquarters, United States Army, Alaska.

## Ticket with a Smile

In passing through Chelsea, Mass., I failed to make a complete stop at a stop sign. Because I had out-of-state plates, the officer on duty, instead of asking me for papers and starting the usual hullabaloo about why not, etc., handed me the enclosed card [below] with a smile. You can be sure

POLICE DEPARTMENT	CITY OF CHELSEA STATE OF MASSACHUSETTS
<b>WELCOME VISITORS</b>	
THIS IS NOT A SUMMONS	
You have inadvertently violated one of our traffic rules:	
namely _____	
Realizing the difficulty of conforming to different traffic regulations in different cities, in this first instance, as a welcome stranger	
<b>YOU ARE EXCUSED</b>	
We want your stay in Chelsea to be as free from unpleasantness as possible. However, traffic regulations have been found to be necessary and in the public interest. We want to help you, and we ask you to help us. Please park your car correctly. This will protect your property and help the officer in his line of duty. Chelsea extends to you a cordial welcome and hopes you will return soon. Do not hesitate to make inquiries of our officers. They will be glad to serve you.	
JOHN J. KIRBY, Chief of Police	By Officer _____

that when I pass through Chelsea, Mass., in the future I will observe every safety rule and every traffic sign.

A. J. WHITE  
Motor Vehicle Research, Boston.

## To Settle an Argument

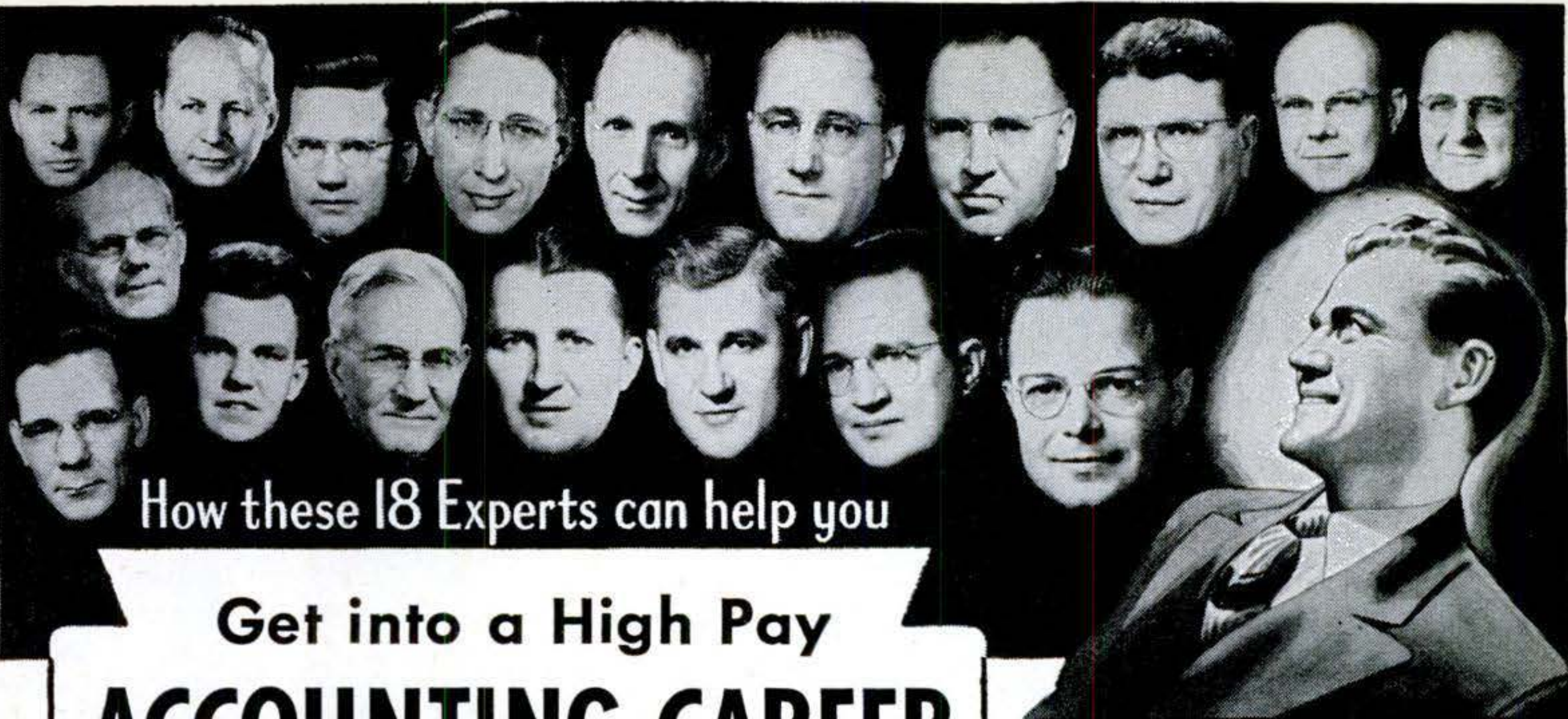
I have been arguing with a friend whether a stream of water is higher or lower at the middle than at the sides. My friend says lower, but I say higher. Who's right?

ANTHONY JERBER, Little Rock, Ark.

*Your friend gets the nod. A stream is lower in the middle than at the edges. That's because there is less upward water pressure in a stream moving swiftly than in one moving slowly. And since the middle of a stream is always moving faster than the sides because of friction with the banks, it is always exerting less upward pressure and is thus lower. The difference, however, is very slight—not more than a few inches, even in the biggest, fastest rivers.*

## PSM Joins "Bandit" Hunt

Allow me to congratulate you for the article "How a One-Armed Bandit Works" [Jan. '52, p. 91]. This article is helping a great deal in the crusade against the "bandit" now being waged in this city and other parts of the Philippines. Owing to the reputation of your magazine, it is believed here that the article will be given considerable



How these 18 Experts can help you

# Get into a High Pay ACCOUNTING CAREER

LaSalle's famous staff of Accounting authorities are helping thousands prepare for fast promotions and bigger pay. They can do the same for you!

If your heart is set on a larger income and all that it means . . . better home—fine car—larger bank account—more of the good things of life. . . .

If that's your ambition and you are really serious about it, then you owe it to yourself to get the REAL FACTS about Accountancy, and the many good-pay opportunities that can be YOURS through LaSalle's famous Problem Method plan.

It matters not whether you've had a single day of experience in this field—or whether you have already started but want to climb higher. LaSalle's expert training is designed to take you from where you are . . . to where you want to be . . . in higher positions and a lifetime career of security and good income.

## WHY YOU CAN'T FAIL TO GAIN

You see on this page a panel of experts who know Accounting from A to Z . . . all the way from simple bookkeeping, on up through advanced accounting, cost accounting, auditing, income tax, and coaching for the C.P.A. degree. These are only part of LaSalle's instruction staff. But what is most important to you . . .

... THESE C.P.A. EXPERTS KNOW HOW TO IMPART THEIR KNOWLEDGE TO OTHERS... HOW TO HELP YOU PREPARE QUICKLY YET THOROUGHLY FOR SUCCESS IN THIS VERY LUCRATIVE FIELD

The proof? What stronger proof could there be than

more than 3,500 Certified Public Accountants (approximately 10% of the U.S. total) who have trained with LaSalle? Or the hundreds of thousands of men and women whom LaSalle has helped qualify rapidly for more money, a brighter future, in a high-pay-lifetime career? These thousands came to us with different backgrounds of experience and varying degrees of ambition. Many have reported raises and promotions after only a few weeks of training. Thousands of them have written to say they are now earning 50% more—even *double* their former incomes—often in less than a year. These letters are published in book form for your inspection. They were written by real people, with real income, problems and ambitions—people who might be your next-door neighbor.

Yes, if you are really sincere in wanting to better your position—start your income climbing—enjoy a lifetime career of high standing and high reward—this friendly staff of experts can help you.

## SEND FOR FREE SAMPLE LESSON... ALSO BIG 48-PAGE BOOK OF LATEST INFORMATION ABOUT CAREER OPPORTUNITIES

You don't have to wonder what LaSalle's Accountancy plan is like. You will be sent a free sample lesson, which does not obligate you in any way. Study it—keep it—see for yourself how simple, clear, and easy it is to master. This is an actual lesson right out of the regular training—to show you exactly how LaSalle's Problem Method has trained more than 1,275,000 men and women from all walks of life.

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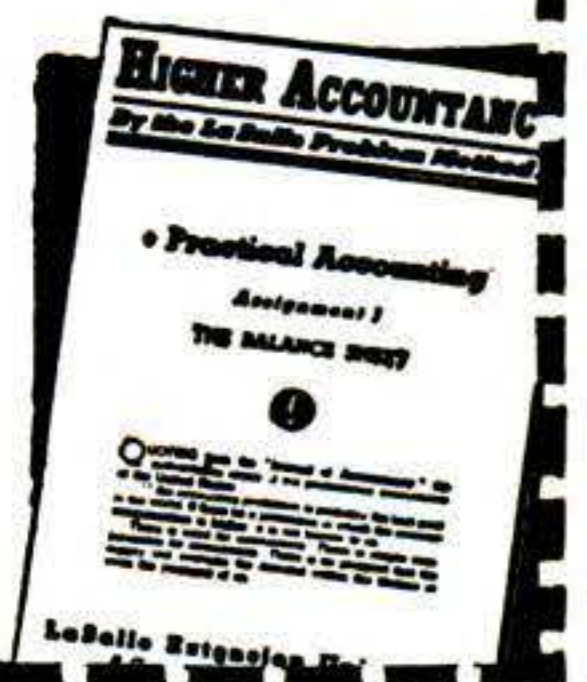
Send free Sample Lesson in Accounting—also, 48-page free book, "Accountancy, the Profession That Pays" . . . all without cost or obligation.

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Address.....

City & Zone.....State.....

FREE SAMPLE LESSON



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Vast numbers of properly trained A & E Mechanics are urgently needed. Our C. A. A. approved school with a quarter-century experience assures your quickest advancement. Embry-Riddle students learn fast with modern equipment, including jet...live aircraft, airline-size hangars.



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Check One  Veteran  Non-Veteran

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evidentiary value in a pending case involving the jackpot.

ANTONIO ABAD TORMIS  
Cebu Press Club  
City of Cebu, Philippines

### **Invention Needed**

Twice within the past year in this vicinity farm tractors have turned over backward, pinning the drivers underneath. One died. Each accident occurred when power was applied too vigorously to a heavy load on a steep grade, causing the front end to rear up and over. Can't this danger be remedied by an automatic clutch release, ignition cut-off, or roll-over bars?

B. C. GWINN, M.D., Athens, Pa.

*Tractor manufacturers have been trying for years to find a solution to this problem, for such accidents occur with alarming frequency wherever tractors are used in hilly country. A mercury switch to cut the ignition when the front end rises is one of many ideas that have been tried and discarded. Even though the power is cut, inertia carries the tractor over. A safety device that will really work well still remains to be invented.*

### **Game Called Because of Tide**

In your story on the Daytona stock-car races ["How Fast Are the New Cars?" Apr. '52, p. 170], you said: "Marshall Teague, the winner, averaged 84.65 miles per hour over the 152-mile distance (37 laps)."



I didn't see the race, but all the notices said it was to be 200 miles, or 48 laps. What happened? Was someone caught lapping?

JIM HUNT, Chicago

*Yes, but not the author. Originally scheduled for 200 miles, the race had to be stopped after 152, or 37 laps, because the fast-incoming tide threatened to maroon hundreds of spectator cars parked on the beach side of the course.*



# INVENTORS

Learn how to protect your invention. The U. S. Patent Laws provide that any new and useful art, machine, article of manufacture, or composition of matter, or any new and useful improvement thereof, may be patented if the act of invention is involved. Therefore, every inventor with a valuable invention should take advantage of the Patent Laws and proceed for patent protection in order to safeguard his rights.

A patent gives the inventor the exclusive right to prevent others from making, using, or selling the invention claimed in the patent for a period of seventeen years.

The Patent Laws were enacted for the benefit of the inventor to give him protection for the features of his invention which are patentable. These features must be properly and concisely set forth and claimed in a formal application for patent, in order to comply with the requirements of the Patent Laws. For that reason, unless the inventor is familiar with patent matters, he should engage a competent registered patent attorney or agent to represent him. We are registered to practice before the U. S. Patent Office and are prepared to serve you in the handling of your patent matters.

A specially prepared booklet entitled "Patent Guide for the Inventor", containing detailed information with respect to patent protection and procedure, together with a "Record of Invention" form will be promptly forwarded to you without obligation upon request.

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**CLARENCE A. O'BRIEN & HARVEY JACOBSON**

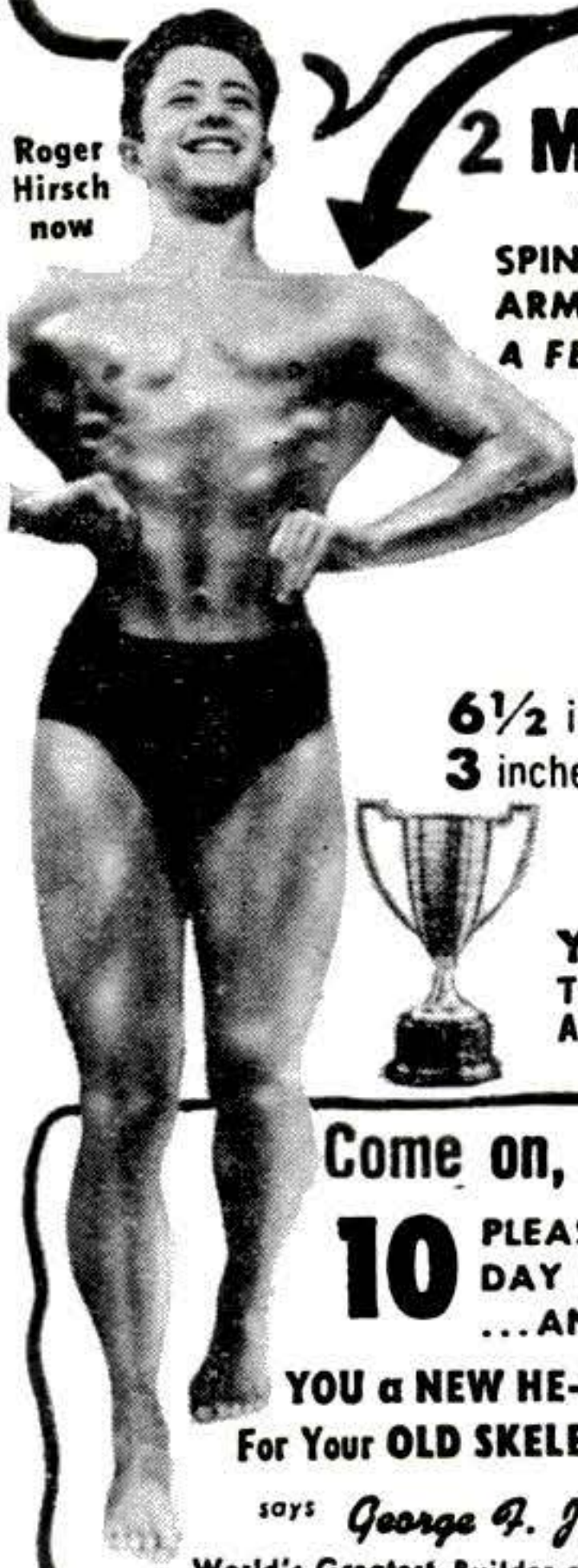
*Registered Patent Attorneys*

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JUNE 1952 15

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Roger Hirsch now



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NO! friend you don't have to be **SKINNY** any more just mail NOW the FREE coupon below as I did. Soon YOU can add

6 1/2 inches to your **CHEST** 3 inches to each **ARM**



and the rest in proportion just as I did.

**You Can WIN** This 15" tall **SILVER TROPHY** As I Did in 10 MINUTES of Fun a Day!

Roger Hirsch before



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**NO!** I don't care how skinny or flabby you are; if you're a teen-ager, in your 20's or 30's or over; if you're short or tall, or what work you do. All I want is JUST 10 EXCITING MINUTES in your home to MAKE YOU OVER by the SAME METHOD I turned myself from a wreck to a Champion of Champions.

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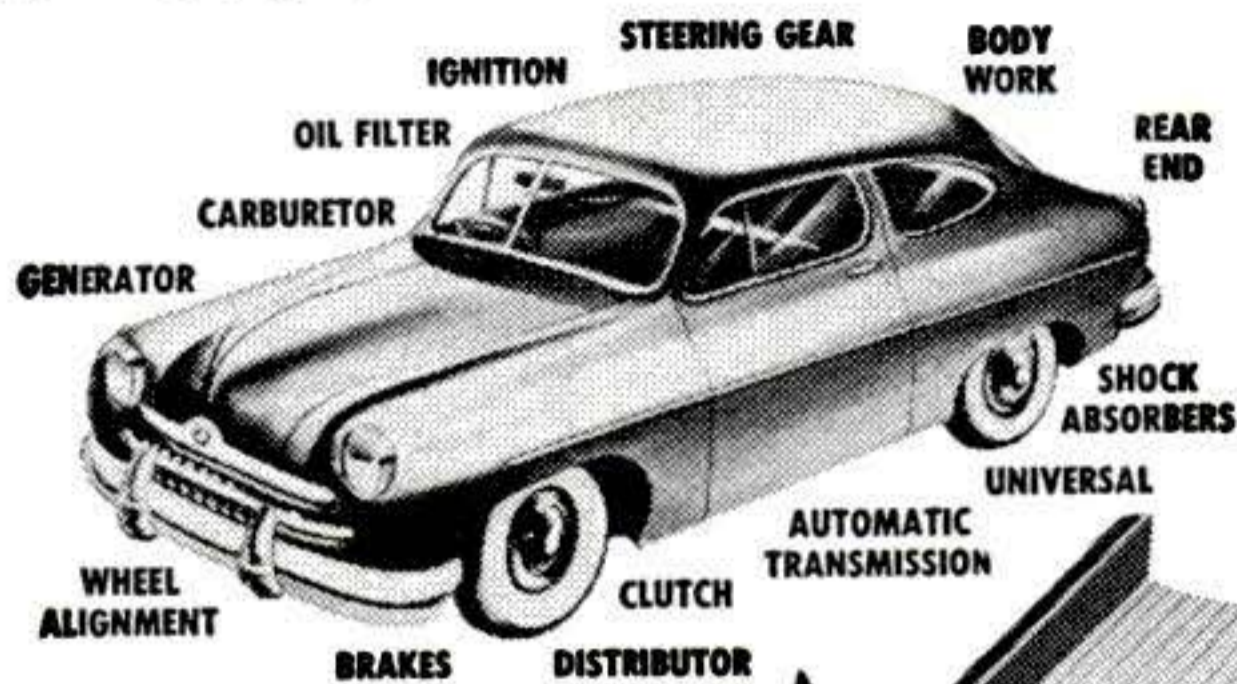
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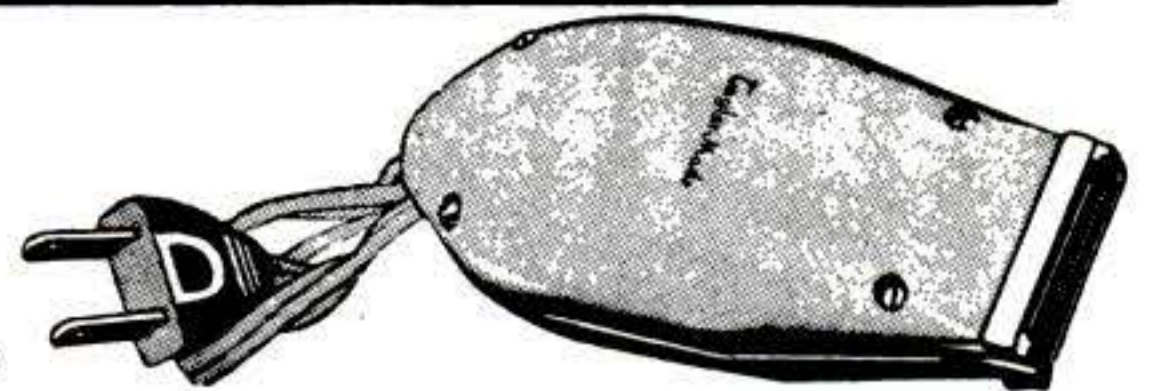
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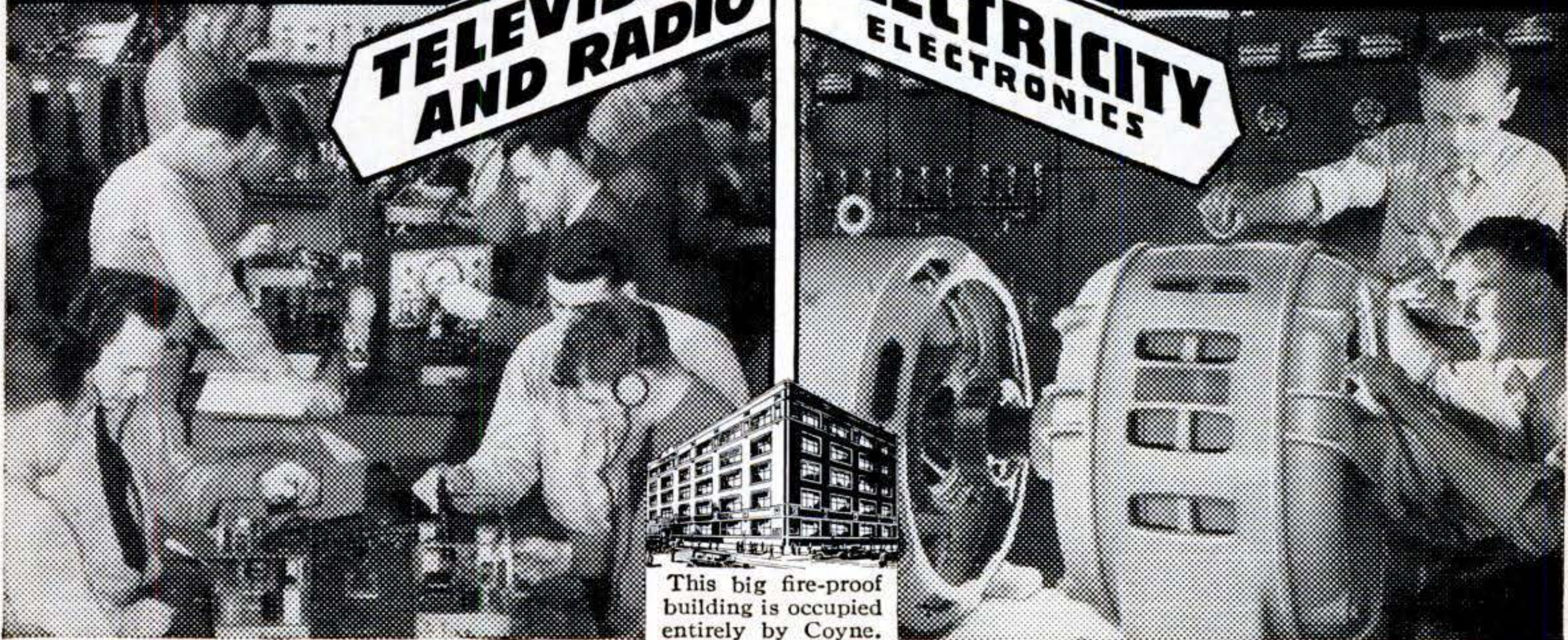
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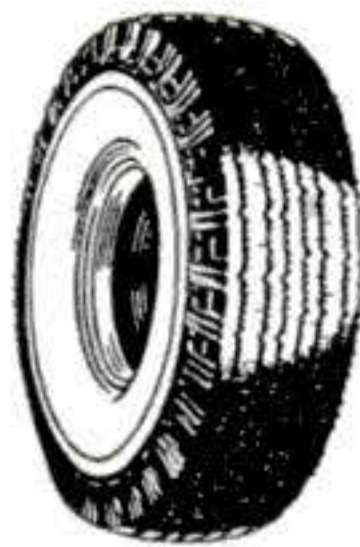
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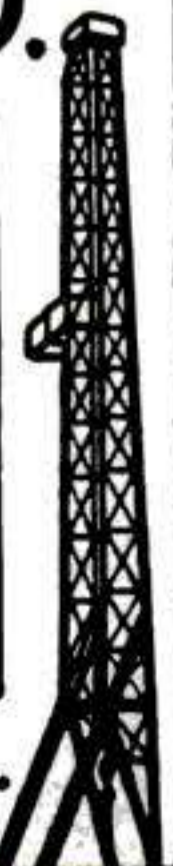
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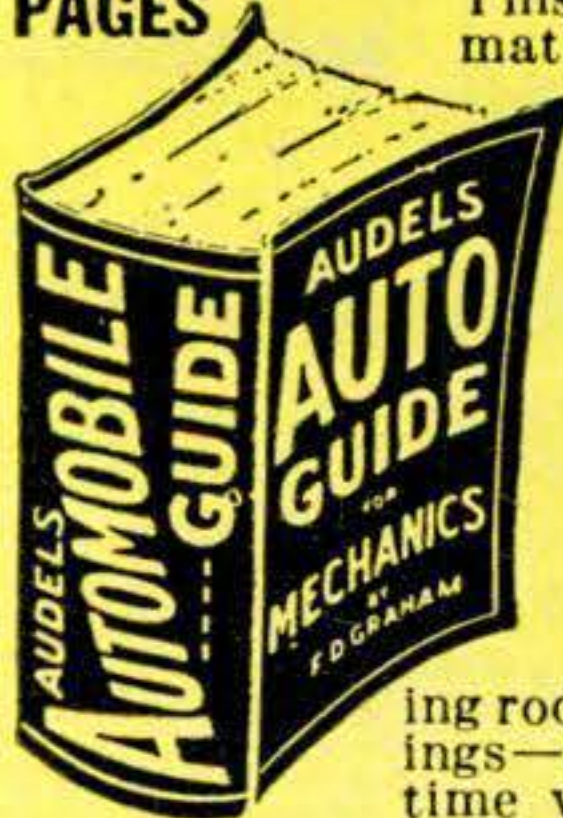
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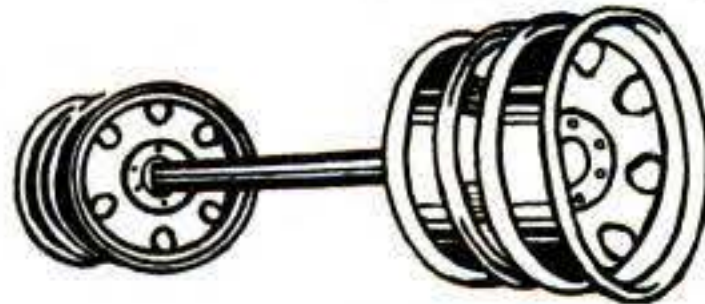
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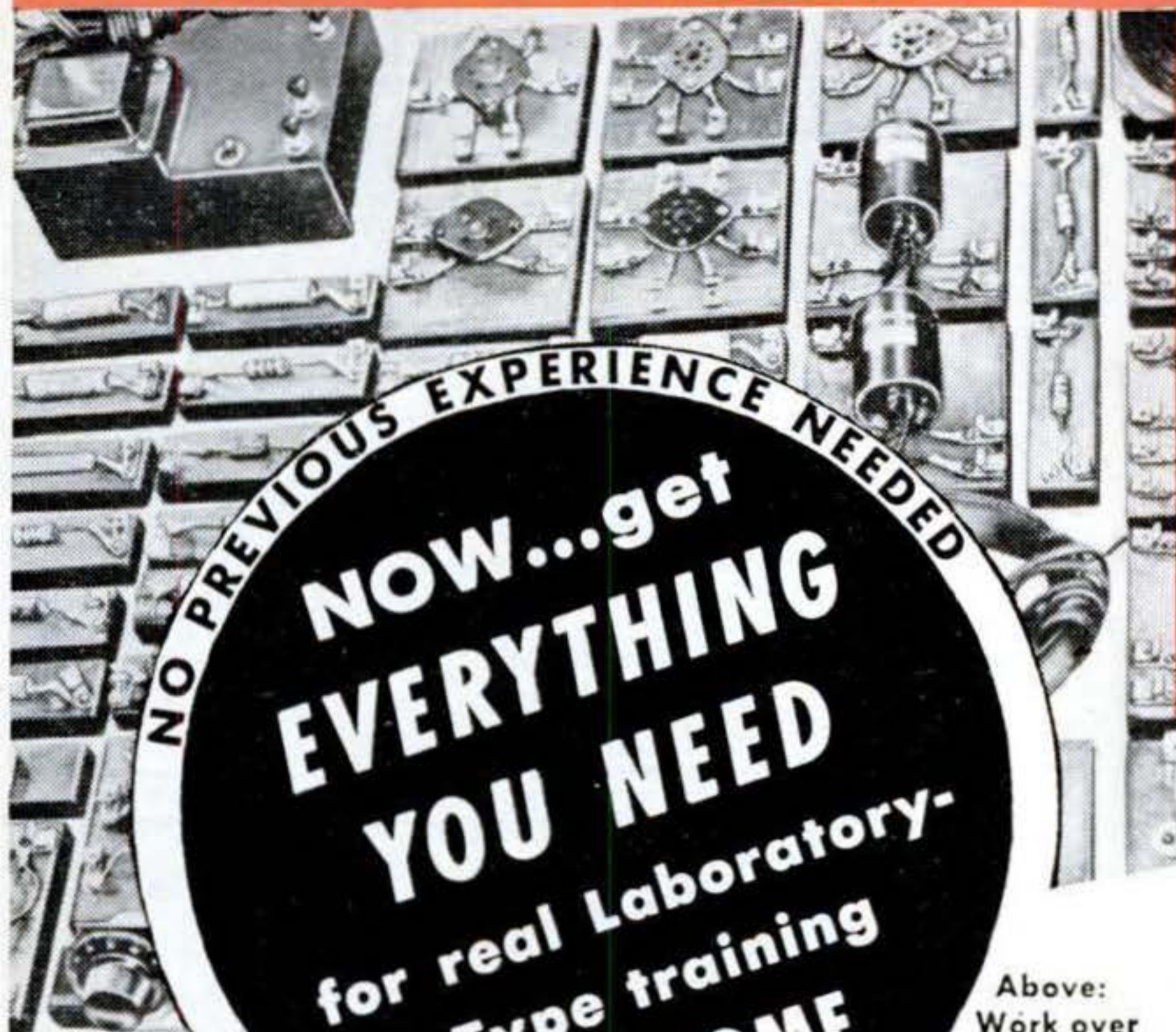
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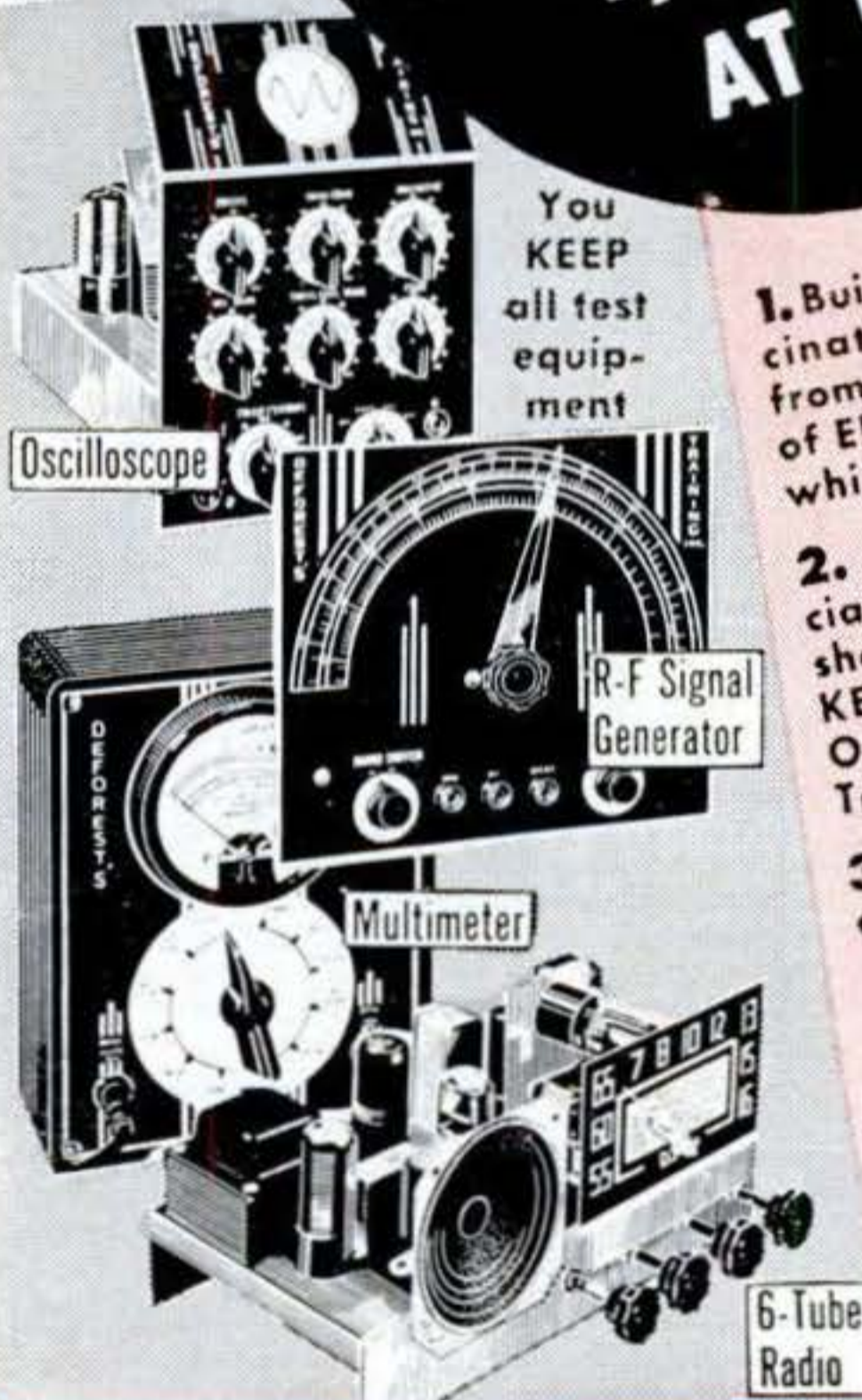
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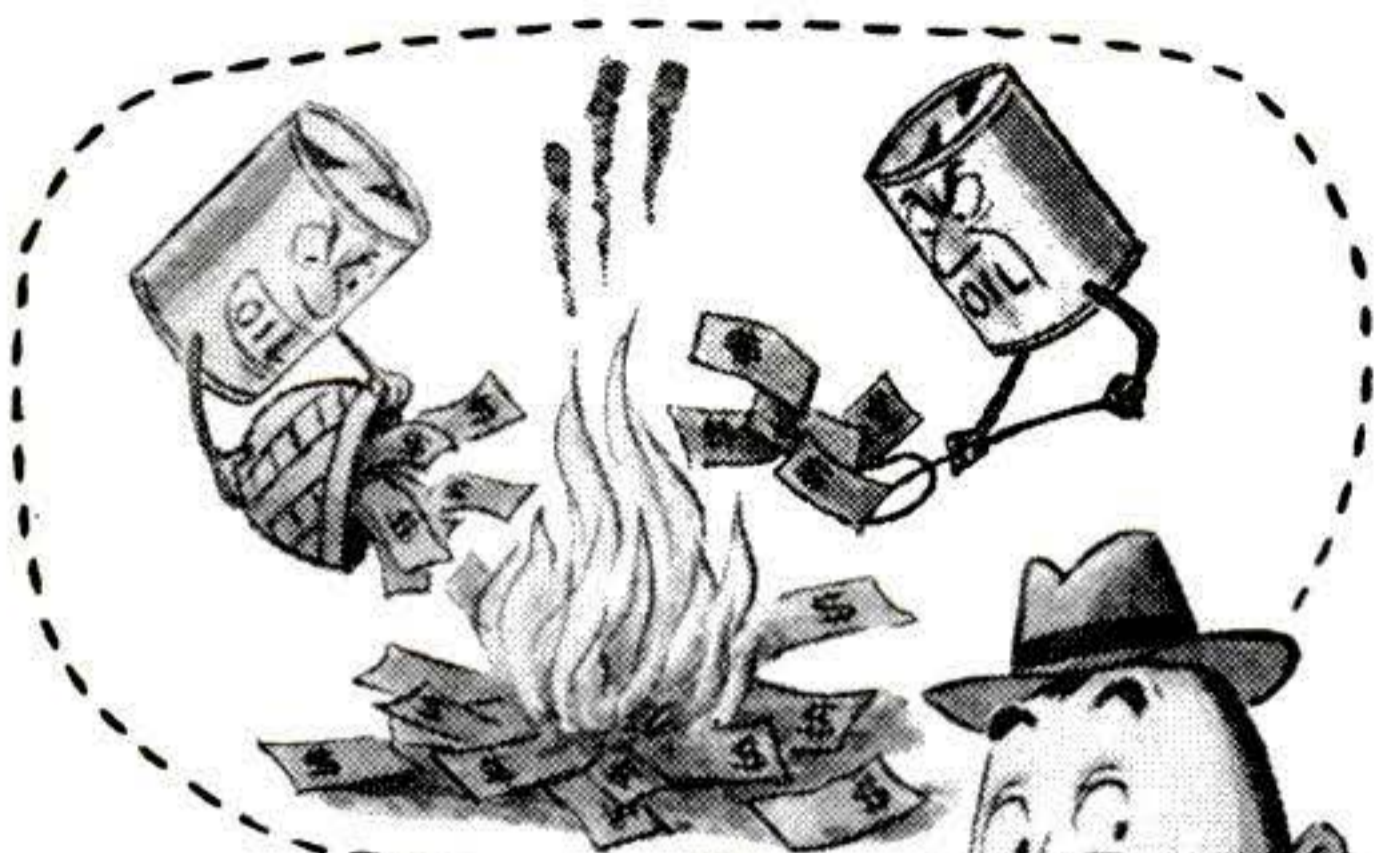
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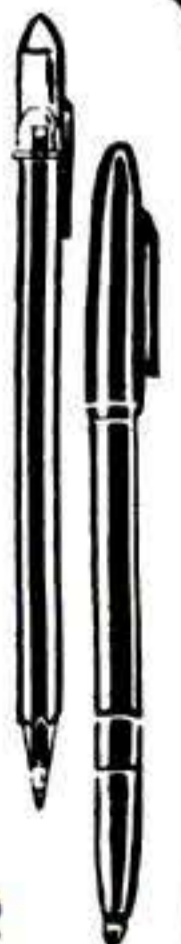
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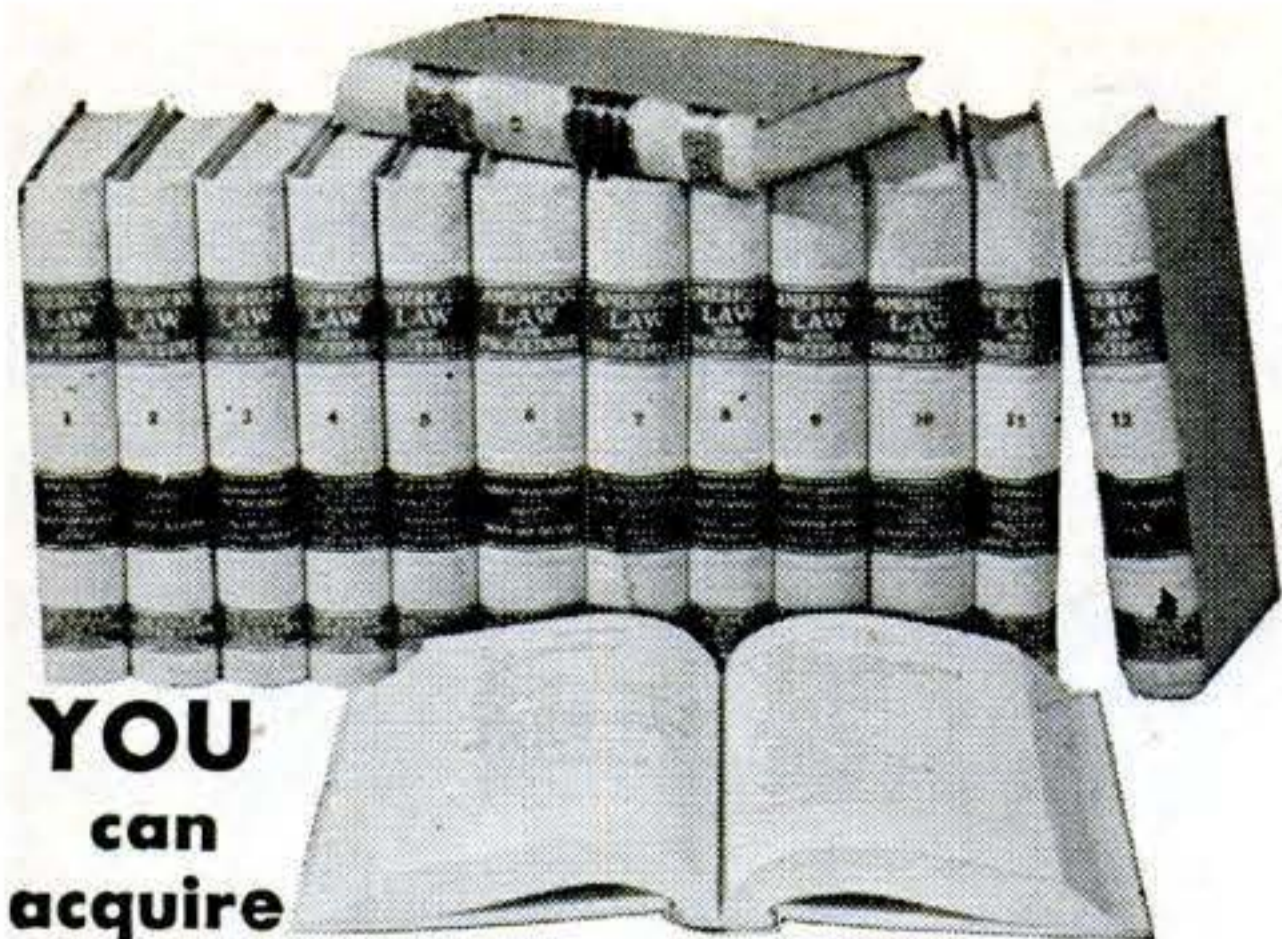
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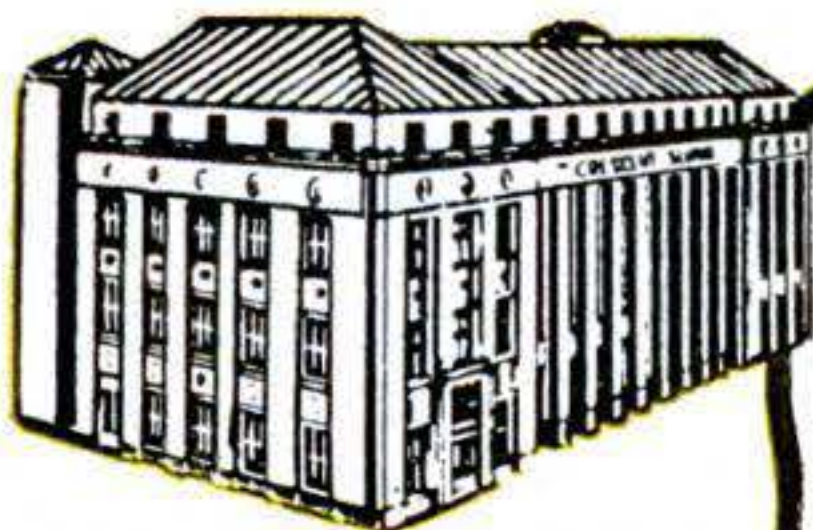
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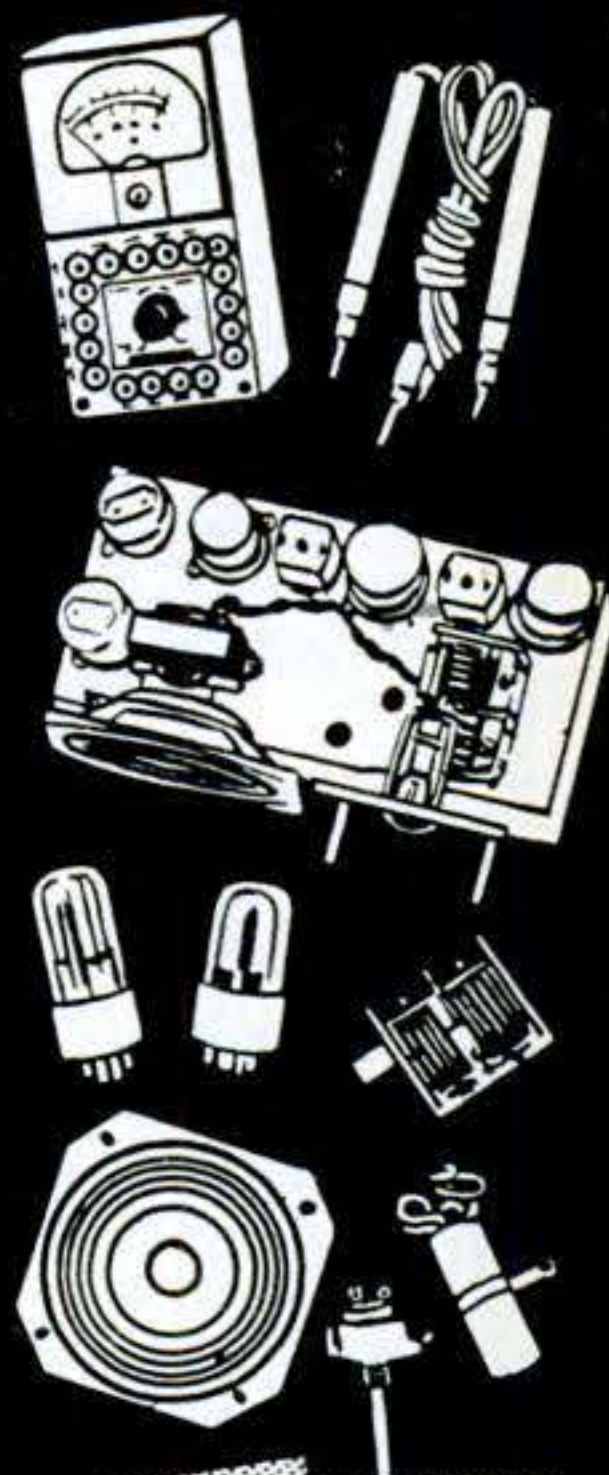
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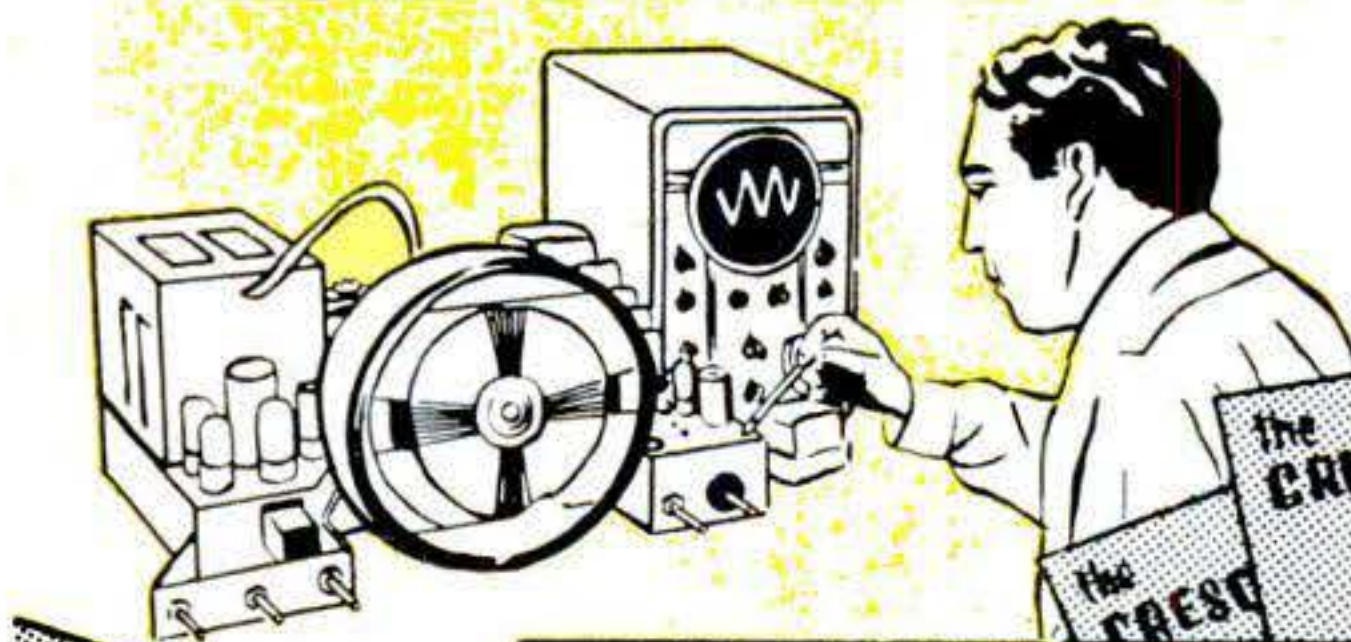
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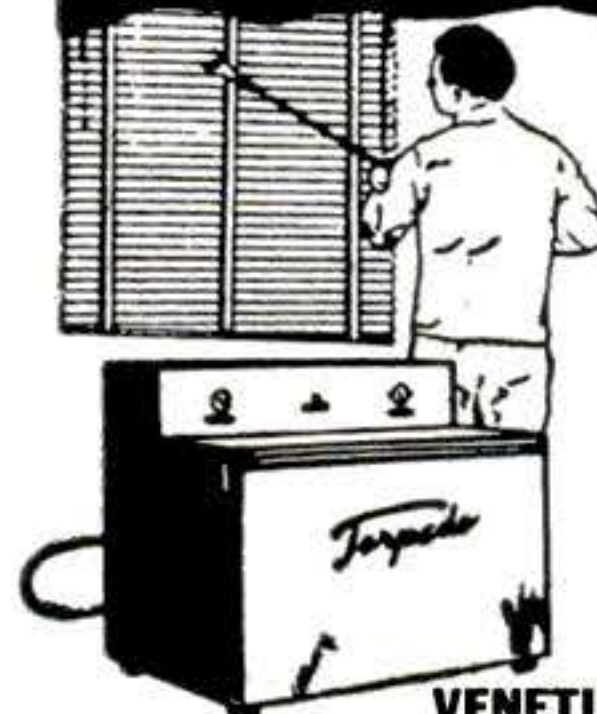
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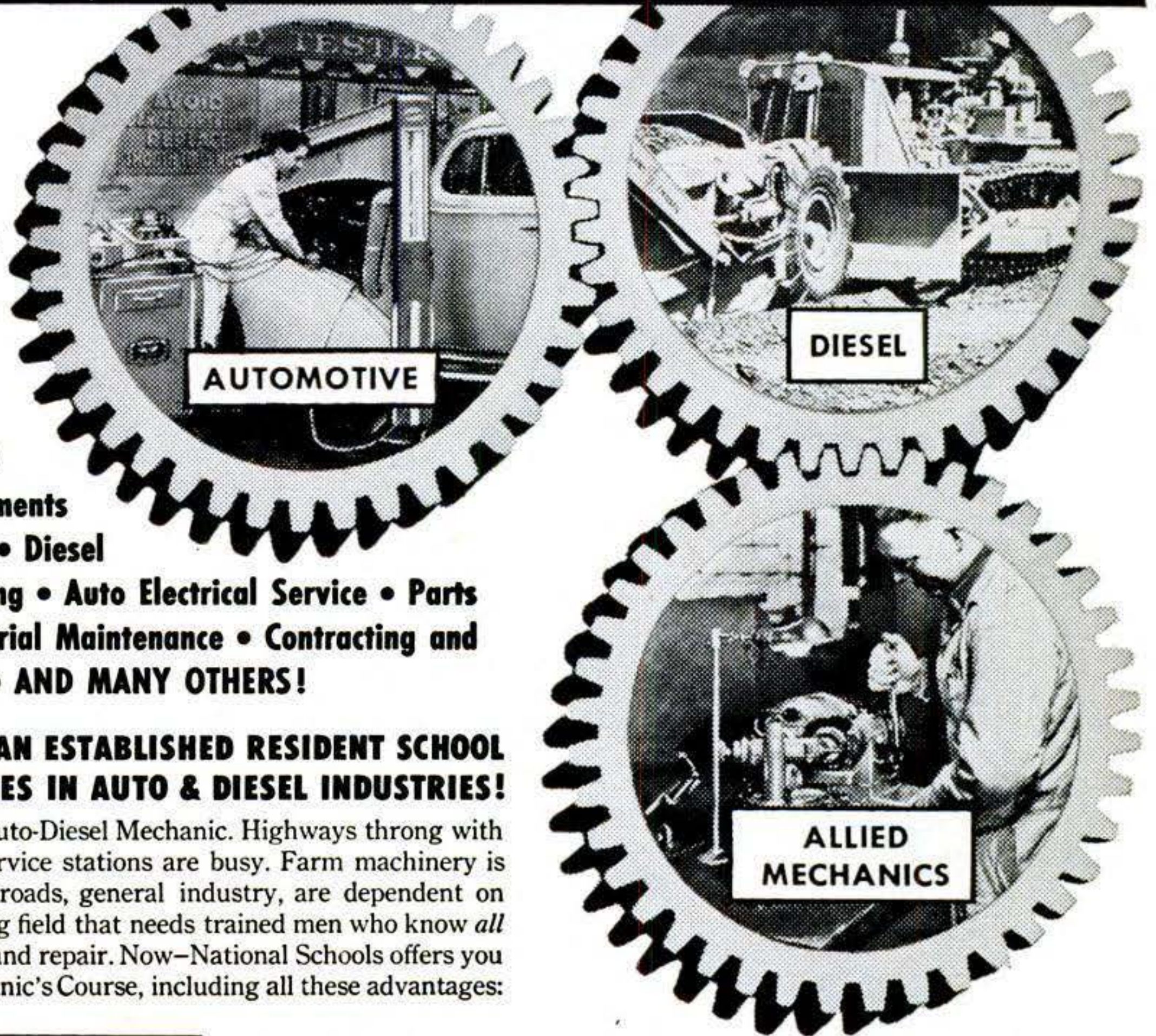
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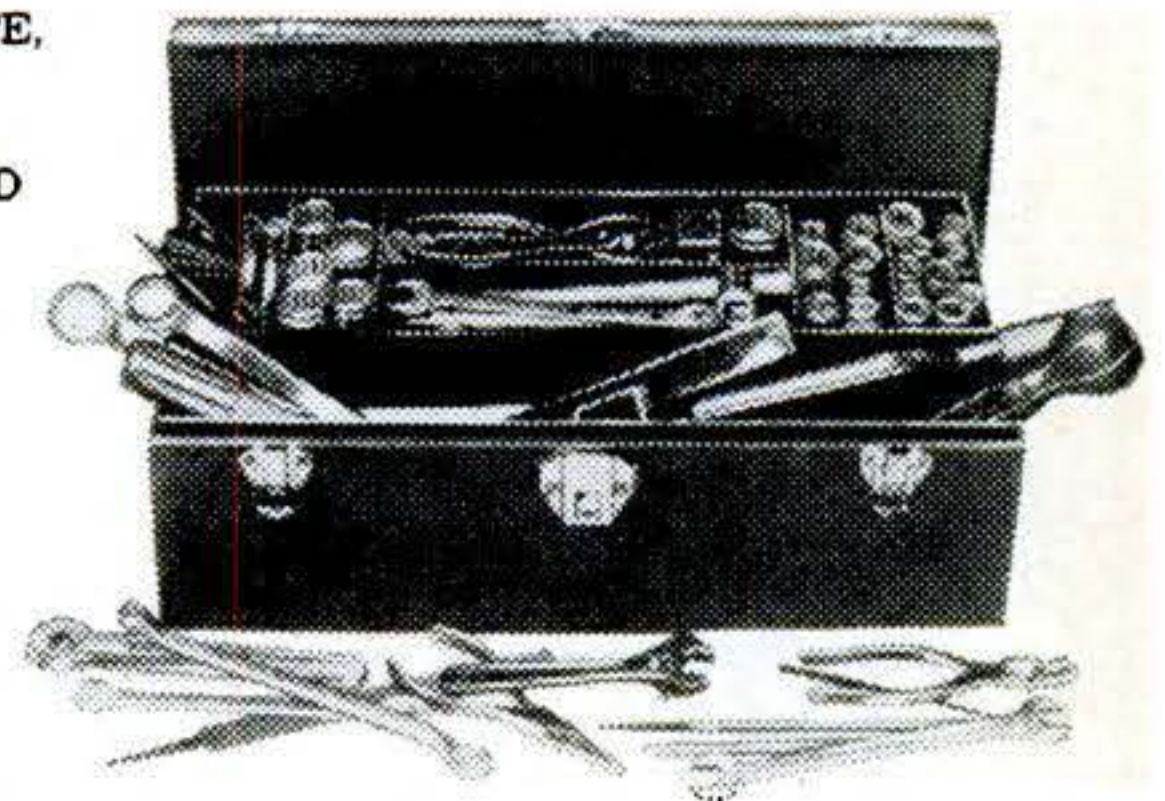
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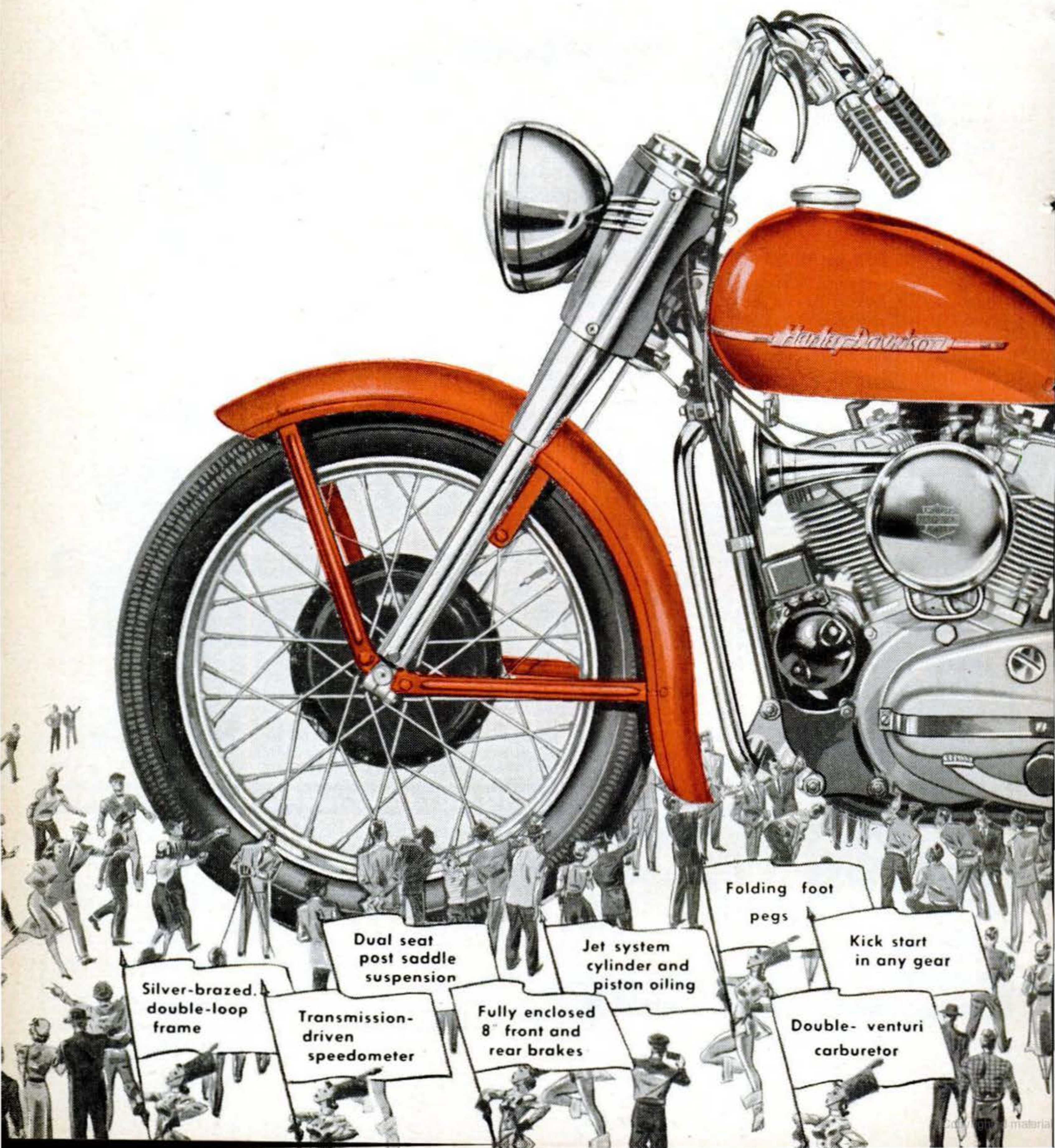
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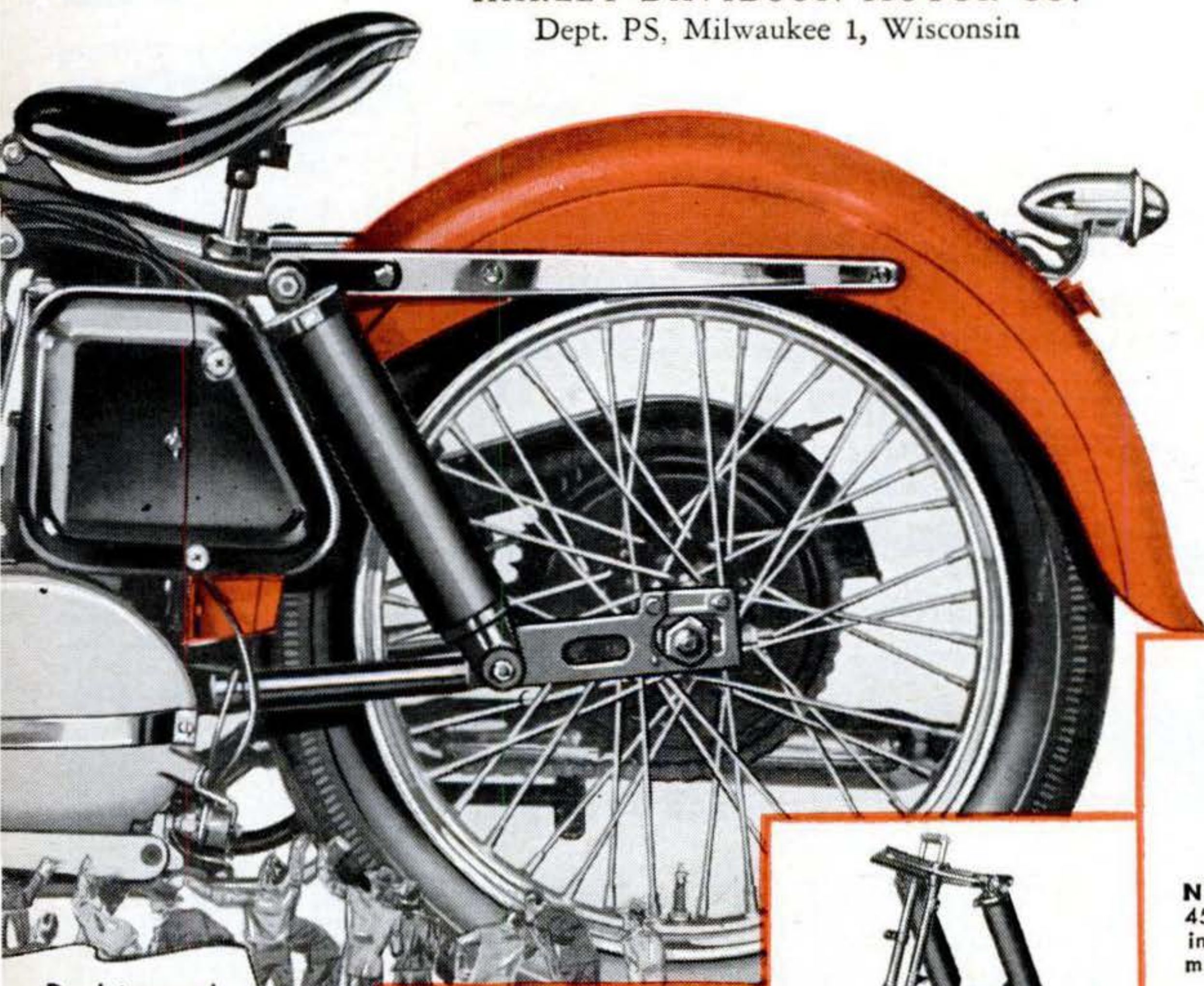
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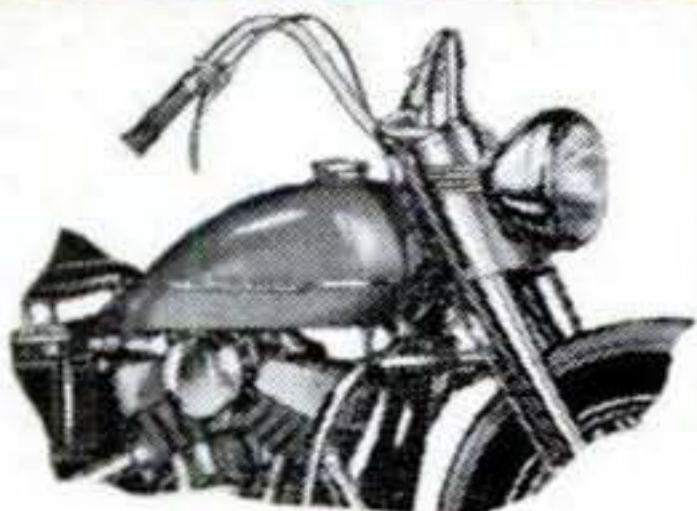
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How many times this month have you been completely blinded by the headlights of another car? How many times have you been blinded when you were driving 30-40-50-miles an hour . . . when you were in the middle of a dangerous intersection . . . when you were turning a sharp curve or corner? Yes, how many times this month have you been forced to trust your life—and the lives of your family—to a driver who doesn't even have the sense to dim his headlights?

## These Accidents Can Be Avoided

Do you know that now you can avoid all these risks? Do you know that during the last five years over 70,000 drivers have found a new way to protect themselves against this headlight blindness? That these drivers have tested and proved an optical instrument that actually makes the brightest headlights as easy to take as dims. Here is that amazing story.

Five years ago, three of the country's top optical experts decided to tackle this problem of headlight glare. They immediately discovered that all of the common remedies were either useless or actually dangerous. These experts discovered that there was only one sure way to protect yourself against this blinding night glare—a piece of optically colored glass worn by you, yourself—that filters out the glare from these headlights in exactly the same way that a pair of sunglasses filters out the glare of the sun.

These experts discovered that scientists had developed such a glass—that many of the leading automobile manufacturers, such as Buick, Cadillac, Oldsmobile, Lincoln and Chrysler—were equipping their special deluxe models with special glare-resistant windshields. However, the cost of this glass on these special cars was necessarily \$20-\$50.

To avoid these costs these experts took this special glare-resistant glass and built it into a pair of Night Driving Glasses that could be worn by any driver. Since they eliminated all rays of glare, the experts called them RAYEX Night Driving Glasses. Here are some of the amazing results they discovered when they tested them.

## This Is How Night Driving Should Be

1. WITH THESE RAYEX Night Driving GLASSES, you can look directly into the brightest headlights. You will see the headlights as pale amber discs—but you will not see the glare. You could pass an entire line of fifty cars, and not even squint.

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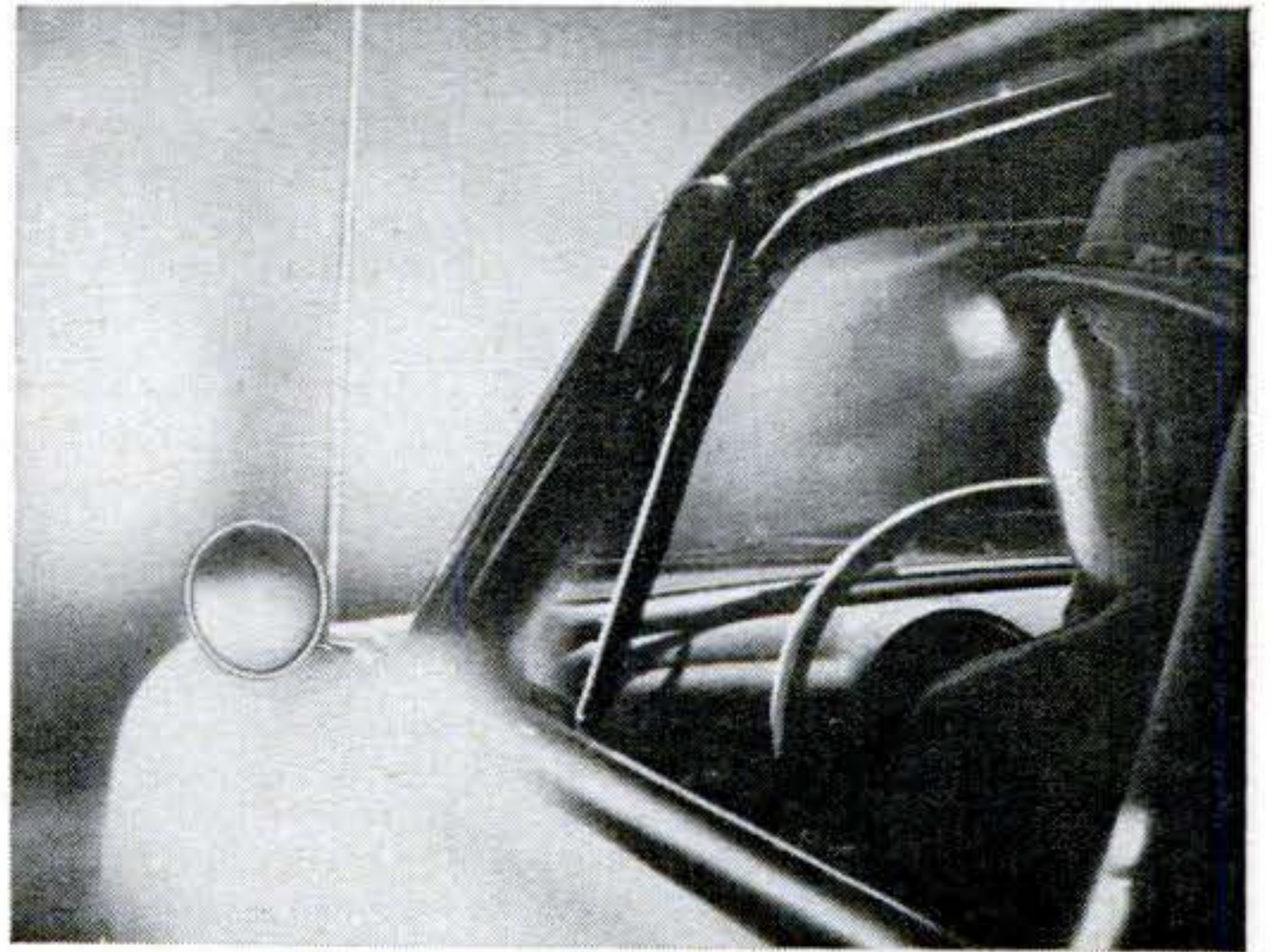
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### DO YOU EVER DRIVE ON THE OPEN HIGHWAY?

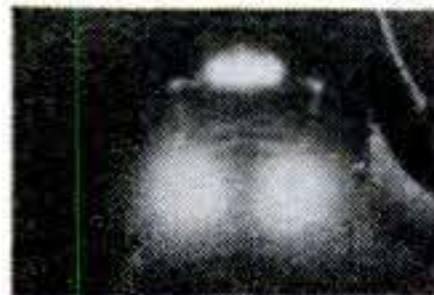
"On my trip to Denver last week, I must have passed at least 50 cars. Not one dimmed down his lights. If I hadn't had your glasses, I would have had to pull over to the shoulder, and wait till they passed by. As it was, I didn't even squint."—Mr. P. M. F., Bremerton, Wash.



**GONE FOREVER! Blinding Headlight Glare—the number one cause of traffic accidents in America today! Read this amazing story of how science conquered this "one unpreventable" accident!**

## Mr. Car Owner Study These Pictures

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Glaring headlights completely blind you . . . set you up for an accident.



Can you see the pedestrians stepping out of the grey shadows of this dark street?



Fog—snow—sleet—all hide oncoming cars—till they're right on top of you.



RAYEX eliminates blinding glare . . . you see lights only as pale amber discs.



RAYEX cuts out grey shadows . . . makes black objects stand out sharper, clearer.



With RAYEX you see through fog glare with almost perfect daylight vision.

**Eliminate Blinding HEADLIGHT GLARE! See What You Have to See After Dark! Do it with RAYEX Night Driving Glasses! Use Coupon to Order them today!**

### DO CHILDREN RIDE IN YOUR CAR?

"I drive my little girl home from a country school during the twilight hours. I was always afraid—either of the blinding lights from the other cars at that hour—or of hitting one of the other little girls in the streets. Now, thank God, I know I can see them. I wouldn't take \$100 for these glasses."—Mrs. L. G., Forest Hills, New York.

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"Drove 112 miles after midnight without the slightest strain. Never felt so relaxed and confident in my life. Thanks."—Mr. D. P., San Antonio, Texas.

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  - 2) Actually help me see better . . . farther . . . clearer after dark.
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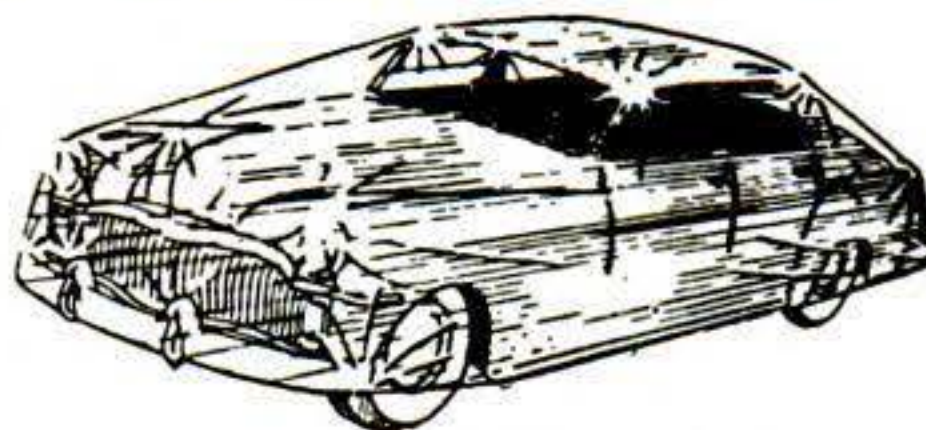
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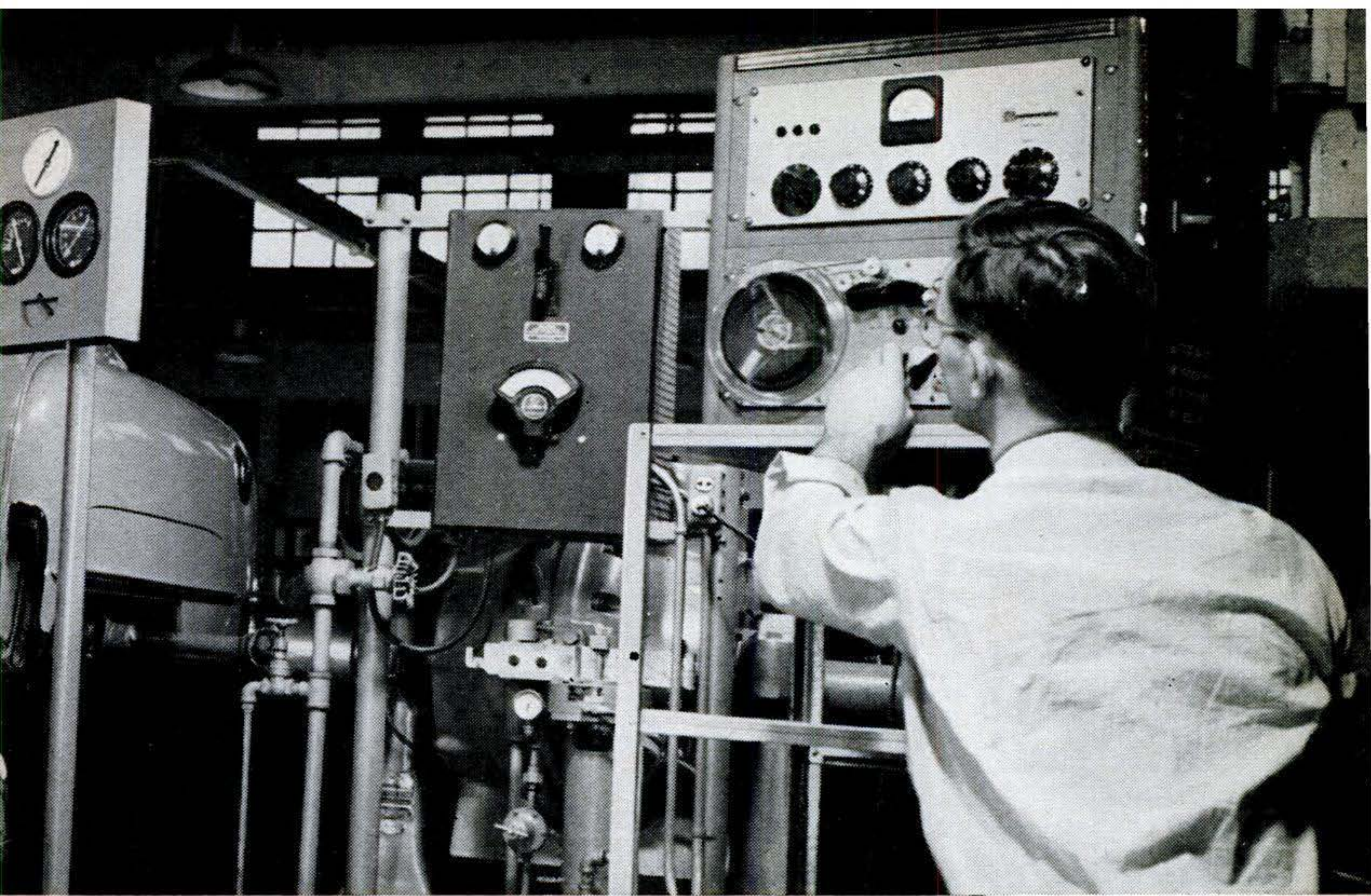
You measure the value of a car very simply: a car that performs better when you drive it, then brings a higher return when you trade it in, is *worth more* to you.

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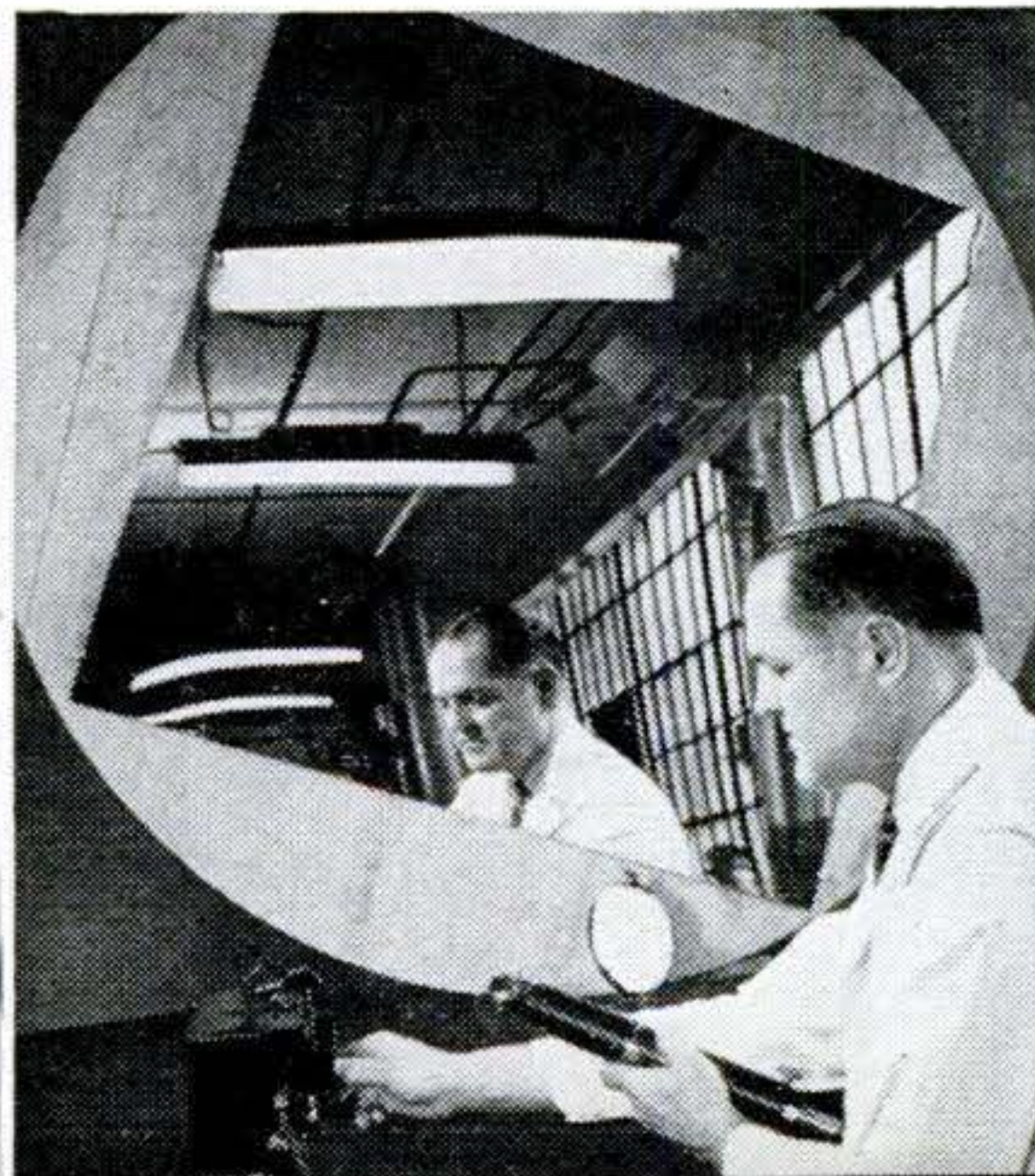
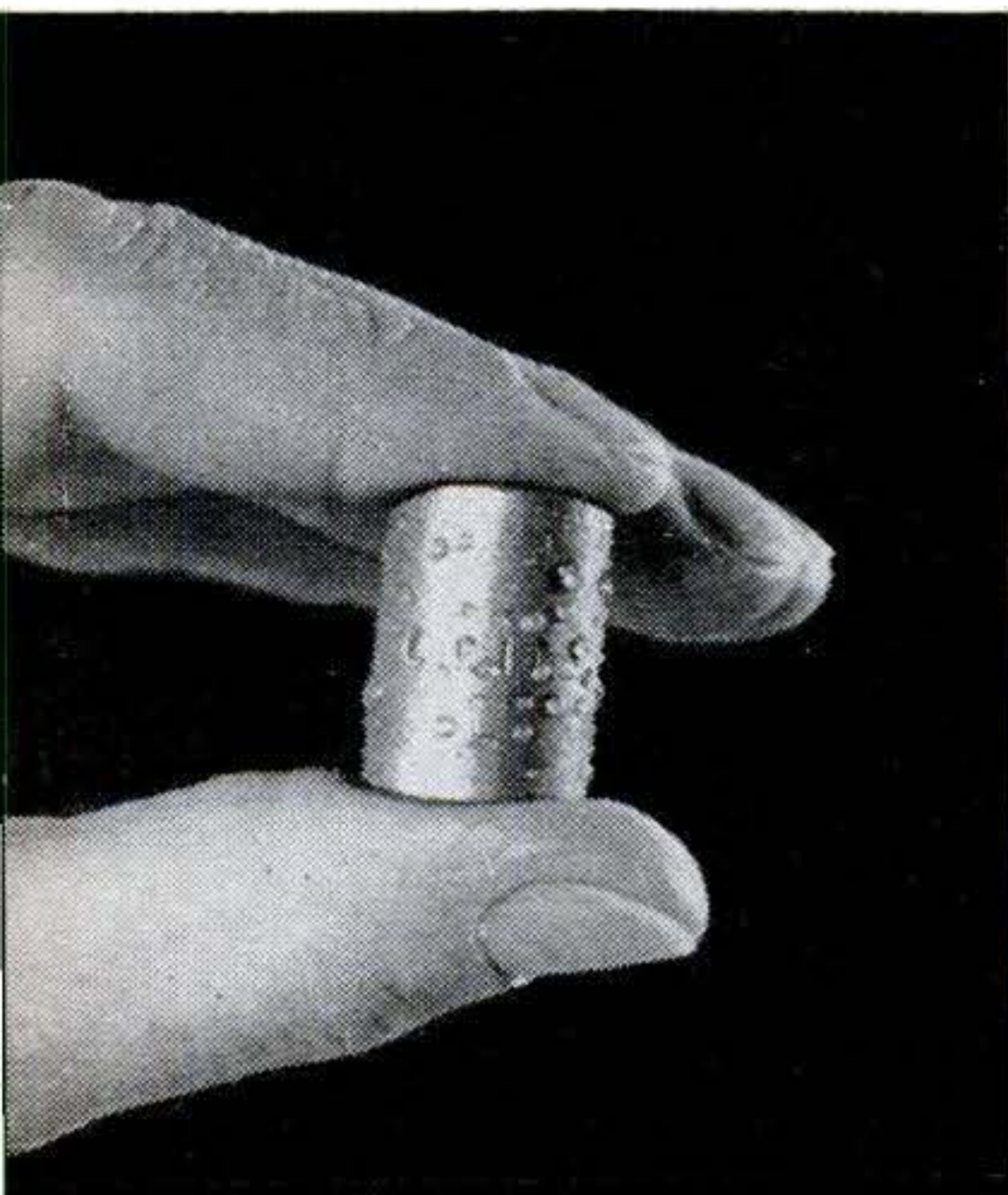
test-driven at varying speeds in the laboratory, as you see here, and other tests are made on the road. These tests help engineers eliminate potential trouble spots *in advance*, giving you more value in Plymouth, Dodge, De Soto and Chrysler cars, and Dodge trucks.

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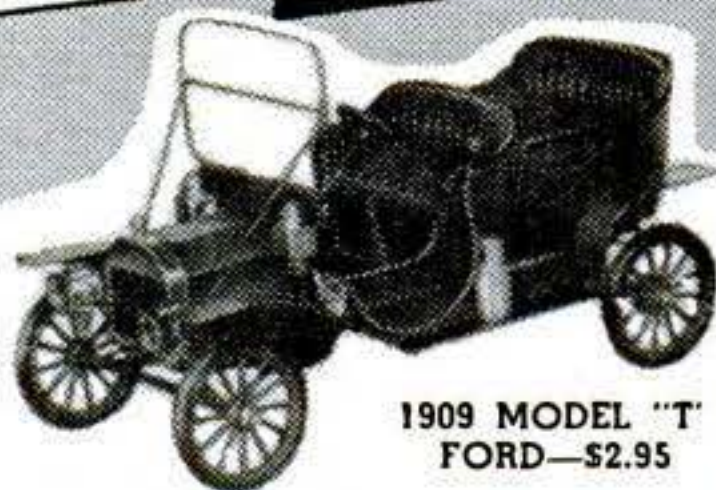
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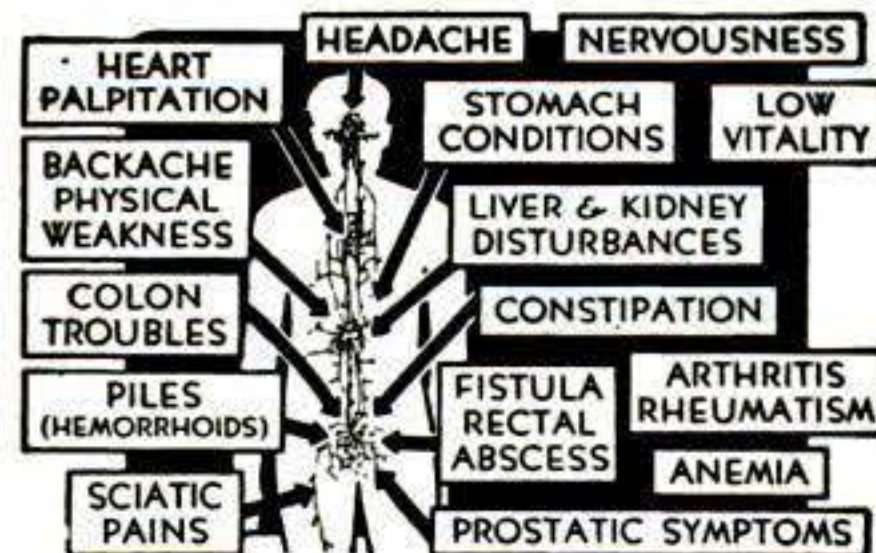
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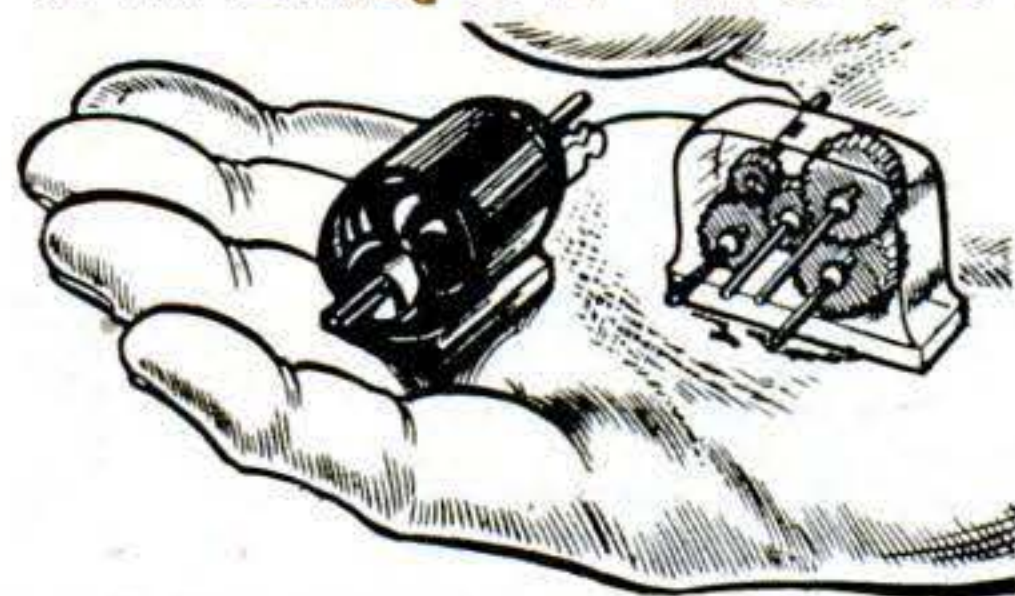
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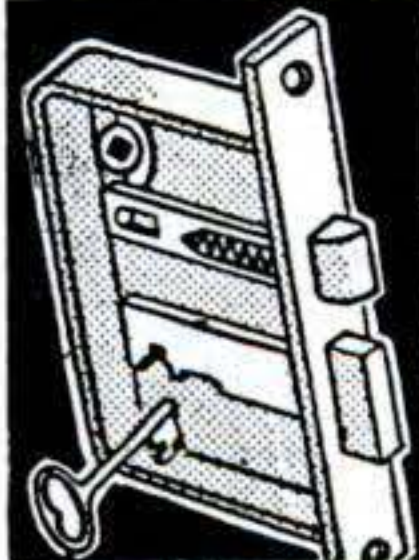
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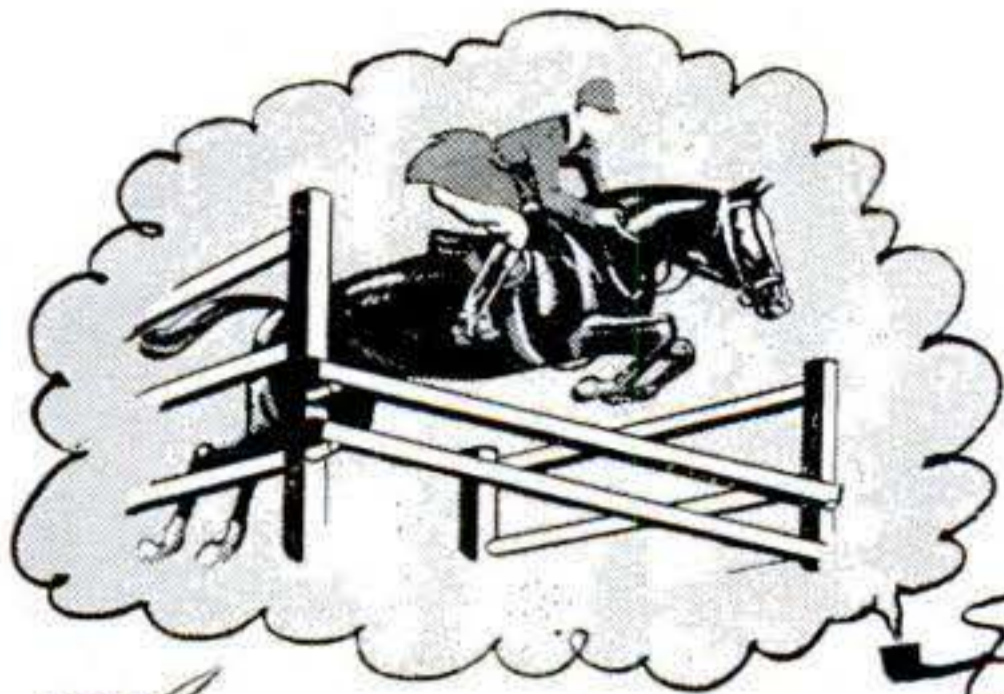
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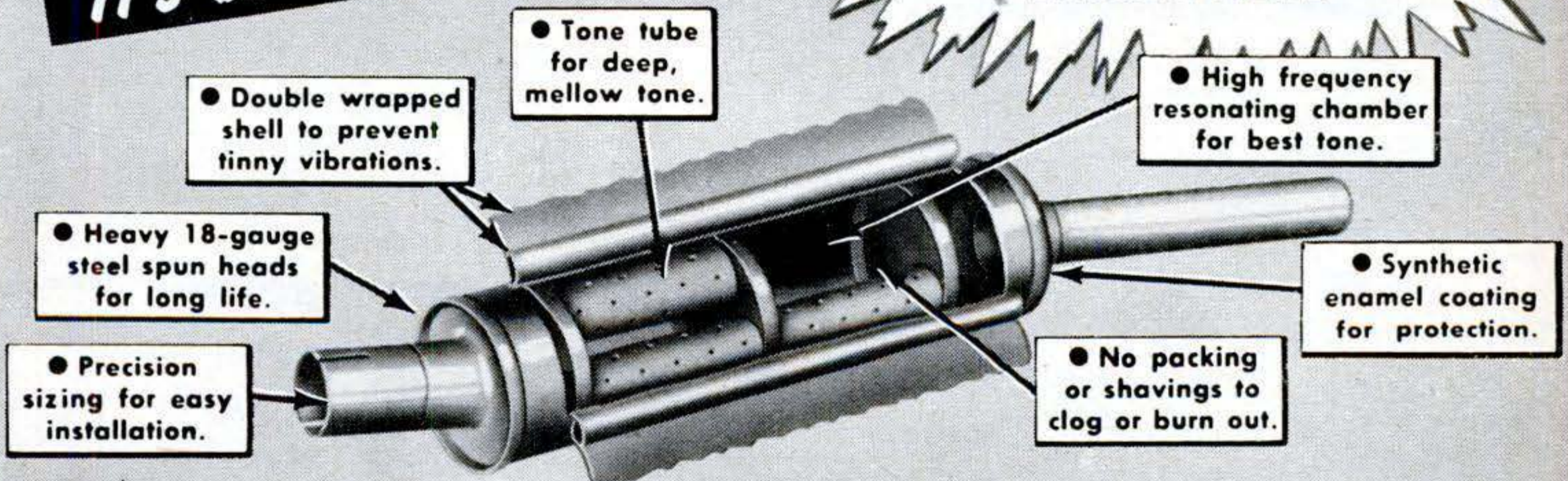


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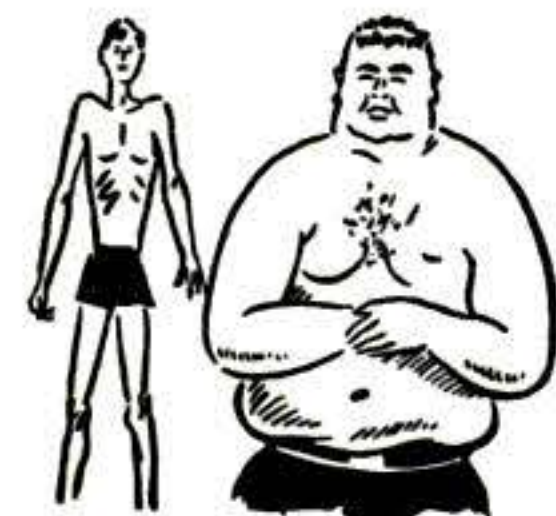
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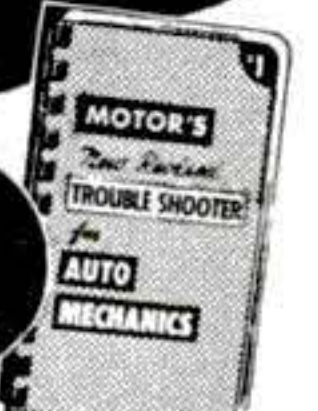
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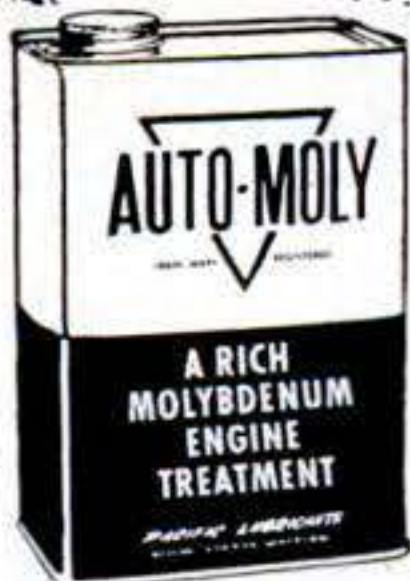
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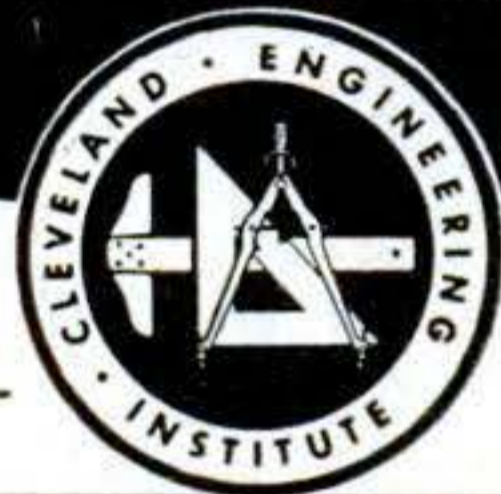
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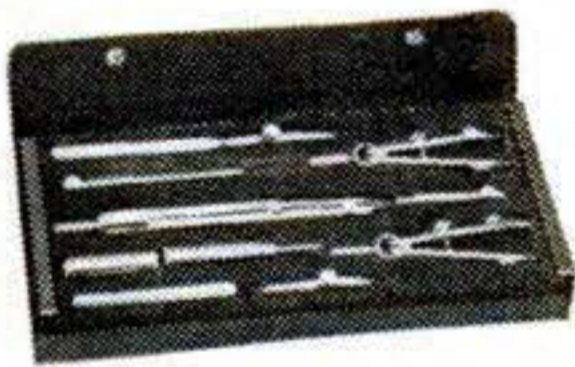


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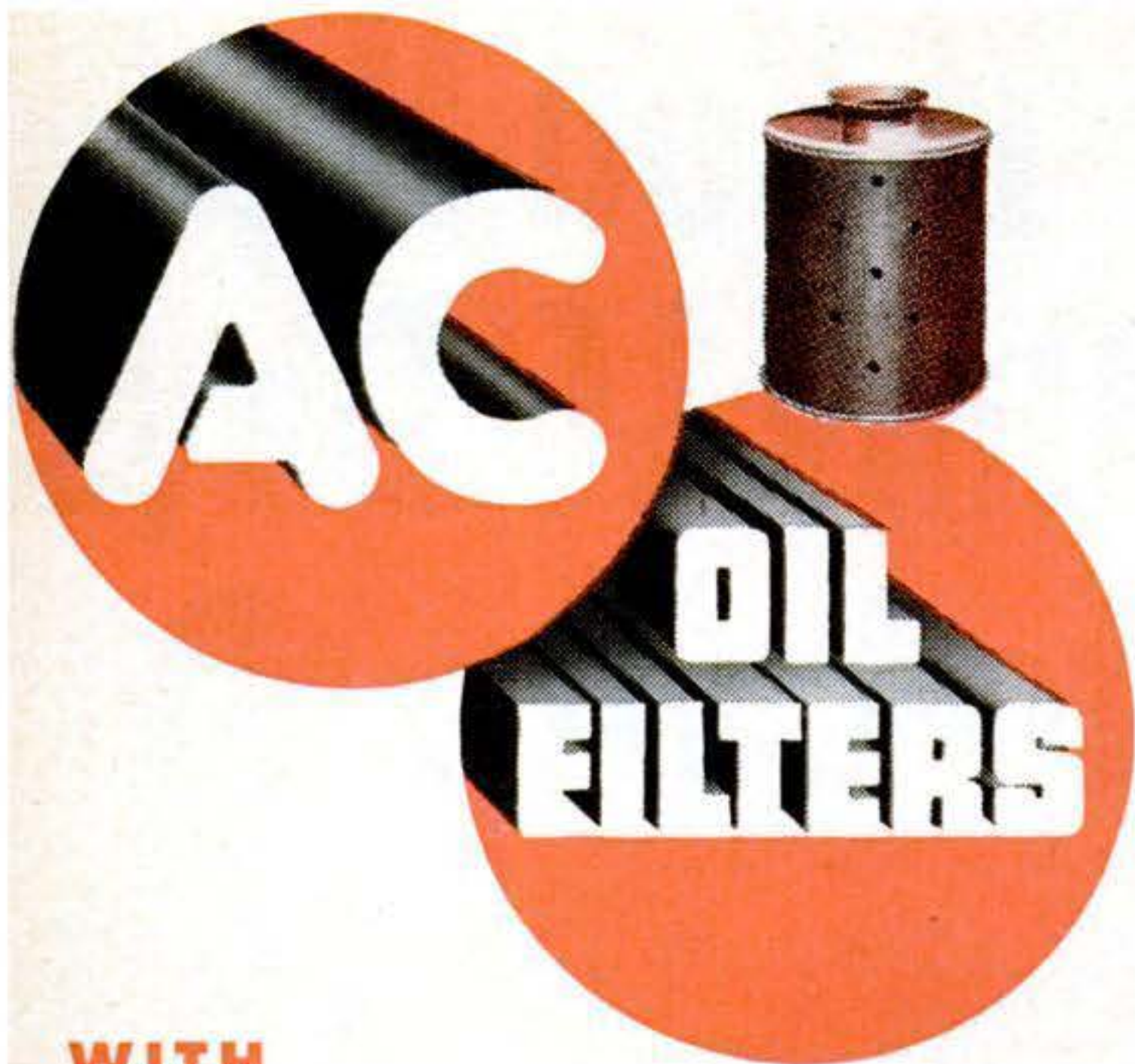
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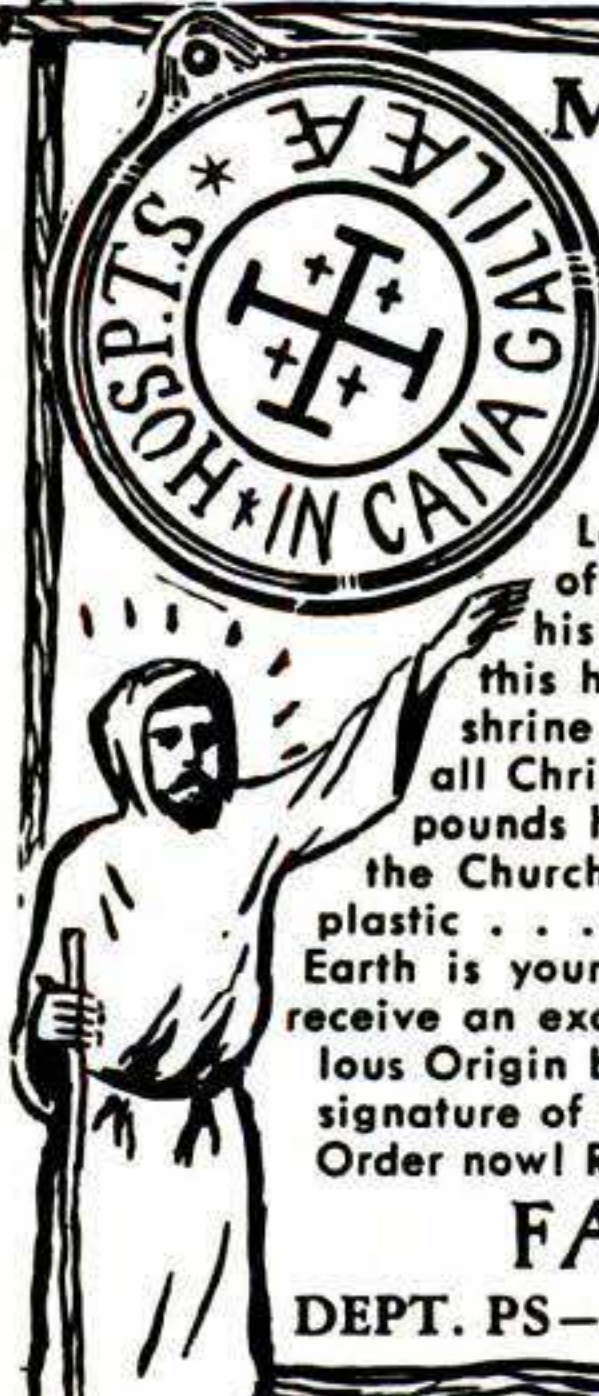


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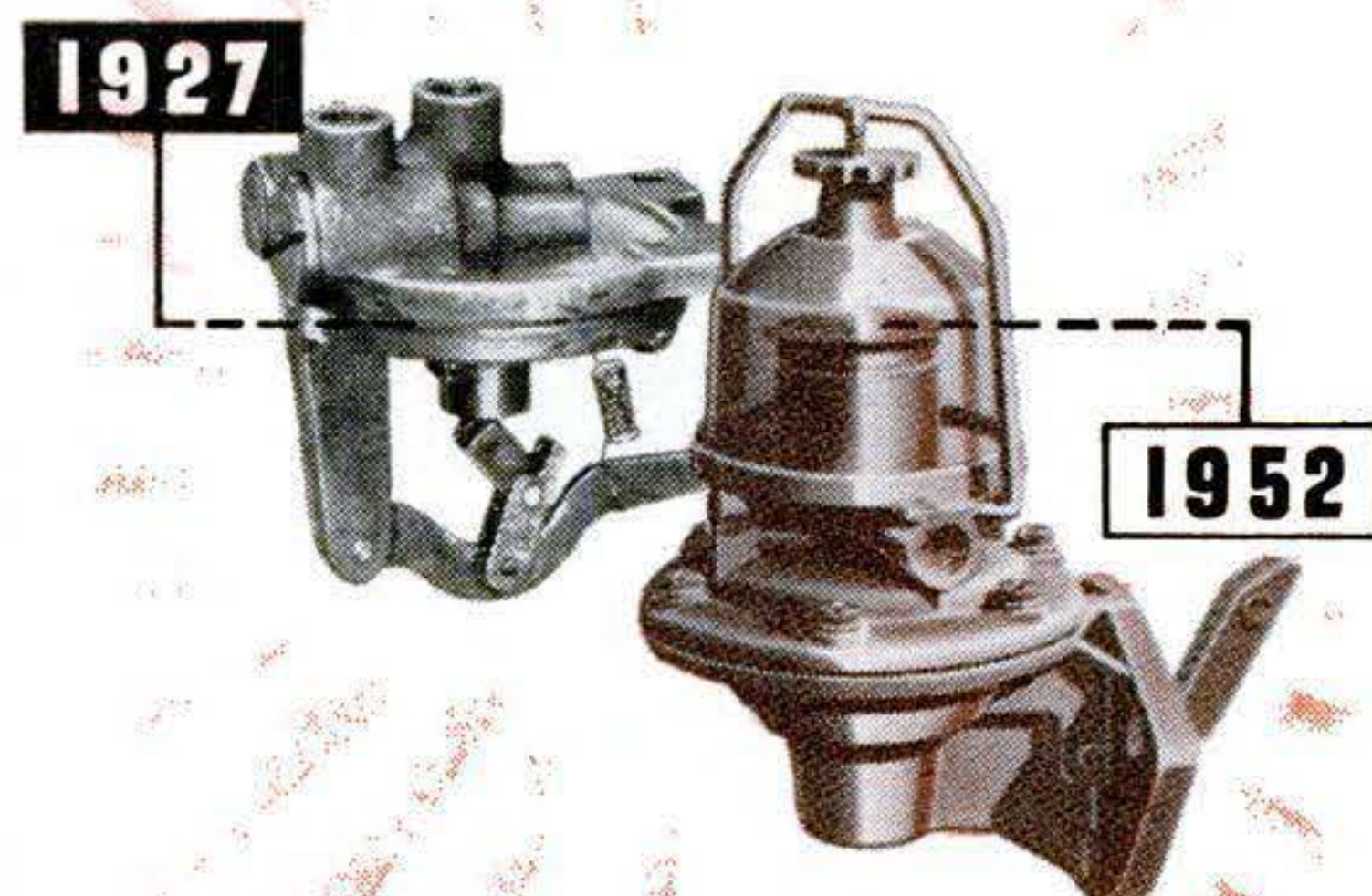
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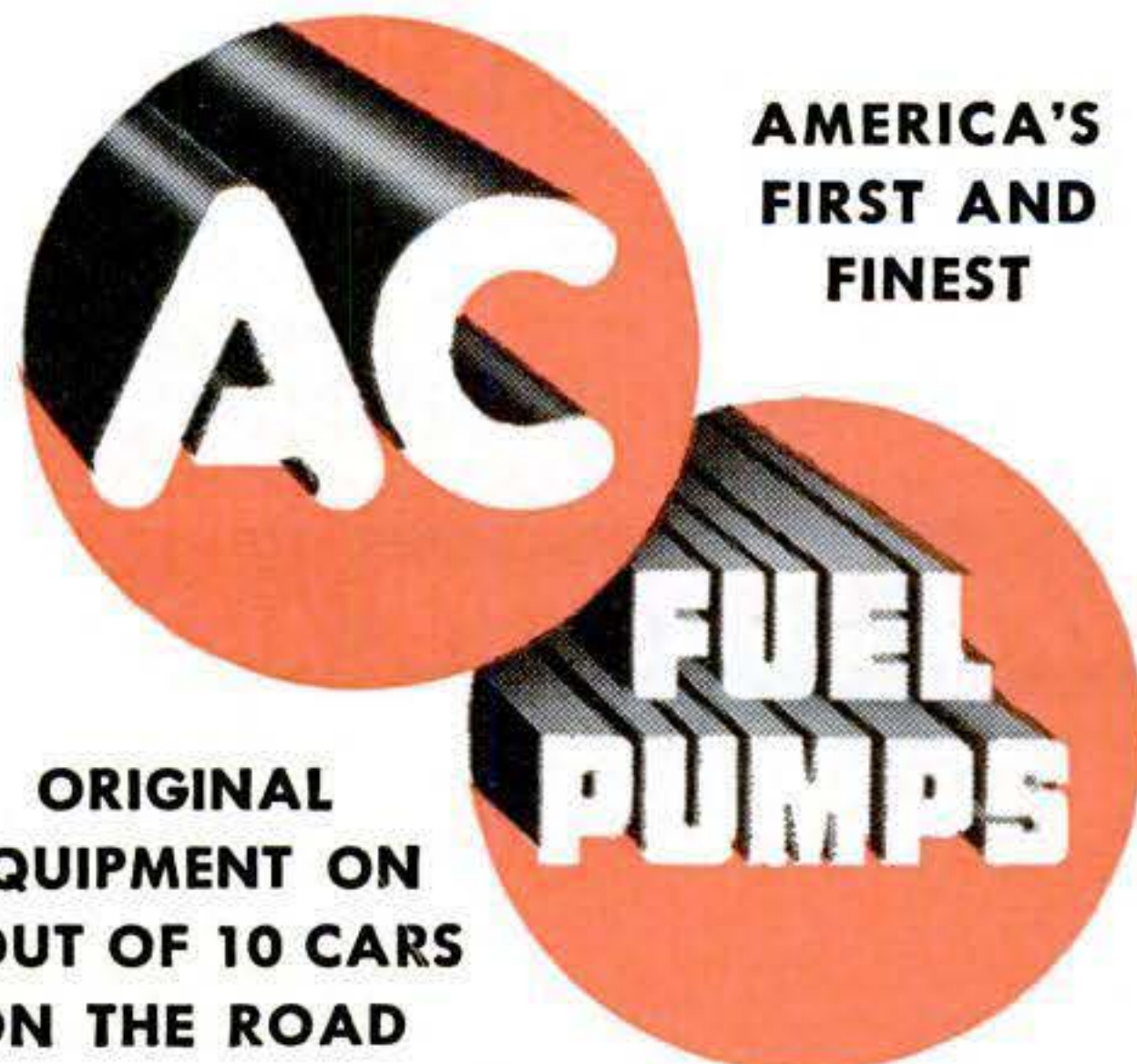


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**T**ODAY almost everyone needs extra money. Increased taxes and increased living costs are making your dollar worth less and less, so you have to have more and more dollars just to keep even. There are lots of good ways to make extra money. I don't say my way is the best. I do say it's one of the easiest and most pleasant. It even leads to making new friends in sort of an endless chain. It doesn't call for house-to-house canvassing, either. Let me explain:

I am Sales Manager for a very big company. We make Stainless Steel Cooking Utensils. We do an enormous business with hotels, restaurants, hospitals, and institutions. We also make utensils for the Army, Navy, and Air Force.

As a result, we have very low manufacturing costs. We can sell a set of Stainless Steel Cookware for home use for about what it costs some companies to make it! In fact, for years we did sell to one Sales Organization who resold our cookware house to house under their own name. They got \$120.00 for the same set that our people sell for less than half of that.

You've probably heard of salesmen who give dinner parties in homes and then take orders from the ladies who attend. These salesmen have to get a high price because it costs money to give parties—he has to make his share—and his supervisor has to make his. The sales organization comes in for a share, and the manufacturer who sells to them has to make his. So there are about five profits added to the actual manufacturing cost.

About two years ago I got to figuring. There are five good reasons why Stainless Steel is the kind of cookware that should be in every home. 1. It washes as easy as a drinking glass. No scouring, scraping or scrubbing. 2. It doesn't rust or corrode—and it doesn't stain. 3. It doesn't affect the taste of food. 4. Buy it once and you're all through buying for life. You can't wear it out.

You see, Stainless Steel is not a coated or plated metal, like chromium plate on the bumper of your car. That chromium plate can chip or wear off and exposes the raw steel underneath. Then the steel rusts. But our kind of Stainless Steel is stainless all the way through. It can't chip, crack, peel, or wear off. You could use a set the rest of your lifetime and then give it to your children and it would still be good for their children. 5. Carlton Ware enables you to prepare food by the method called "waterless cooking" which keeps more of the natural minerals and vitamins in your food and makes the food taste better.

Well, I figured that if the price was low enough every family could afford Stainless Steel Carlton Ware. So I worked out this plan! We would sell a complete set of 19 pieces at a figure that would include our profit. Then you add your profit and re-sell this set to your friends and neighbors for less than half of the usual price charged on the "party plan." You actually save them more than half. They are glad to get such a bargain and they feel that you've done them a real favor. That's because the set they buy has in it only two profits, ours and yours. Both our profit and your profit is small and fair.

The plan becomes like an endless chain. When a woman gets her first piece of Carlton Ware she gets so thrilled with its better cooking and easy cleaning that she talks and talks. She can't wait to demonstrate it to her friends and tell them all about it. She's so proud of its silvery sheen and so happy about how easily it washes that she just "bubbles over." So just by letting your own friends in on a good thing, before you know it their friends call you up and ask if you can get the

same low prices for them. Then their friends call you and their friends' friends. It goes on and on!

To make an extra \$125.00 a month, you only have to deliver ten sets and that's easy. Mrs. Montell in Pennsylvania took orders for \$1400.00 worth in her first month. And Mrs. William Hanchow wrote, "Got my set Saturday—I already have 17 customers."

Now, I'll let you in on another part of my plan. If you take only ten set orders a month for six months, my company pays your expenses for a winter vacation in Florida. You and one other member of your family can spend a whole week at our expense. My company maintains a beautiful resort in the Florida Keys just so our sales representatives can enjoy a Florida vacation at company expense.

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## CLASSIFIED

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**BUSINESS** Of Your Own, Full or part time. No investment or previous training required. Opportunity unlimited. Write today. Scientific Electric Co., Box 2162pc, Cleveland 8, Ohio.

**START** Mailorder Bookshop—Build your future, 25c brings booklet, samples, exciting ideas. General Publications, Ossining 1, New York.

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**AMAZING** genuine crushed red cedar! Cedarizes closets, trunks, drawers! Applied like paint; laboratory guaranteed. Hardware, paint, building supply dealers buy quantities. Attractively packaged; tremendous profit potential! Exclusive distributors: investment for merchandise only. Write for samples, details. Millen Mfg., 91-H Summit, Brookline, Mass.

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**SELL Appliances, Aluminware, Watches, Silverware, Radios, Gifts, Pricelist free.** Belmont, 200-2 Hinsdale Street, Brooklyn 7, New York.

**NATURAL Molding Latex, Extra thick.** Free sample, W. Wooley, 115B Donald, Peoria, Illinois.

**"MAKE Perfume" Profitable Mailorder business—Catalogue Free.** "International." 6347 Parnell—PS-6, Chicago 21, Ill.

**MAKE Money at home—mailing literature—running Ads. Pleasant and profitable.** Write Miller, 1772-R Carlyon Road, East Cleveland 12, Ohio.

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**EARN Extra Money weekly mailing circulars for advertisers. Complete instructions—25c.** Siwaslian, 4317-B Gleane Street, Elmhurst 73, New York.

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**INCOME from local information. No selling. Write—Neherco, La Verne 6, Calif.**

**MAKE Perfumes At Home. Write, "Carey Laboratories." 1914 Chouteau PS-6, St. Louis 3, Missouri.**

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**BIG-Paying home mailorder business. Details free. Jackson, Newfoundland 7, Ky.**

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**TIN-Cans. Turn them into cash. Nine methods. Instructions 50c. Charles Company, 12-EAD, Norwood, Ohio.**

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**AGENTS Mailorder Merchandise. Beautiful pulling circulars. Fiant Products, Duenweg, Missouri.**

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**MAIL Selling opportunities galore! Free! Wehner, Box 142-E, Roxbury 19, Mass.**

**ADDRESS Our Postcards. Send stamped envelope for reply. Wilson Publishers, 1987 Studer Ave., Columbus 7, Ohio.**

**START Business without Capital! Reliance, 15-B Park Row, New York 38, N. Y.**

**FIGURINES unpainted, free illustrated list. Haverty Products, 822-A 17th Street, Altoona, Penna.**

**MAILING postcards selling repeat merchandise is profitable. Everything supplied. Details free. Gordon Publishers, Box 23, Pawtucket, R. I.**

**BOOKKEEPERS. Keep books, small firms spare time. Manual latest technique by C. P. A. \$3.00. Modern Business, Box 406, Youngstown 1, Ohio.**

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**DRUG Sundries. All popular brands latex. Fresh stock. Sell to drug stores, physicians and jobbers. Free distributors price list. Sanitary Sales Co., Box 934, Rockford, Illinois.**

**LITTLE as \$10 starts your business; 50 different kinds; local; mail order; workable. Natmerch, Box 1975-BF, Little Rock, Arkansas.**

**BUY it wholesale. Manufacturers. Distributors. Over 850,000 items. Literature free. Olsen, 1231-B East Third St., Duluth 5, Minnesota.**

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**WOULD you like to make extra money in your spare time! For free information write, Grable Enterprises, 26314 Normandy, Roseville, Michigan.**

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### 38 **MONEYMAKING OPPORTUNITIES**

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**21 POPCORN, Candy Apple Formulas, proven money-makers. Send \$1 today for formulas, catalog of money-making ideas. Concession Supply, 3916 Secor, Toledo, O.**

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**SPARETIME Profits Taking Subscriptions All Magazines. Wholesale Catalog Free. Cassell Publishers, Westfield 1, N. J.**

**UP to \$25 weekly assembling costume jewelry at home. Send 10c for complete money making plan. Gemcraft, 1812D E. 13 St., Cleveland 14, Ohio.**

**UNPAINTED Plaques, Bookends, Novelties, Stamp brings list. Umlauf, 239 So. Luther, Detroit 25, Michigan.**

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**RACE for oil! Get in the exciting race for oil on Western public land. Liberal U. S. laws allow citizens valuable oil rights. Thousands profit, some as high as \$250,000 for \$250; \$11,000 for \$200. Details free. California Lease Co., Bonded Lease Broker, 7075PS Hollywood Blvd., Los Angeles 28.**

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**\$35. WEEKLY addressing envelopes. Instructions \$1., refundable. Adservice, Spring Valley 36, New York.**

**MONEYMAKING Mail Selling plans, only 25c. Jones, Box 413, Morehead City, North Carolina.**

**MAKE tremendous profits with fast-selling Costume Jewelry! Buy Direct! Sell your friends, neighbors and customers at big savings to them! Write for our Free Catalog! Penn Jewelry, Dept. 17, 826 W. Lacka, Scranton, Pa.**

**\$100-\$200 WEEKENDS no selling or manufacturing Brennan, 4025-Y Lankershim, North Hollywood, Calif.**

**EARN Money Evenings, copying and duplicating comic cartoons for advertisers. Adservice, Argyle 2, Wisconsin.**

**MONEYMAKING books for handymen. Catalog Free, Newton Company, Bonham 8, Texas.**

**ADJUSTERS Needed Now! Excellent high pay positions open with airlines, insurance companies and government departments. Qualify now. Write today, Universal Schools, P-126, Box 8202, Dallas 5, Texas.**

**PROFITABLE Homework opportunities. Free details. Pallo's, Box 504, Yonkers 1, New York.**

**BE Appointed State Notary Public Now! Details; Stationers, Helotes, Texas.**

**SALESMEN—\$100.00 more weekly by using "Secret" on present job. Brennan, 4025-A Lankershim, North Hollywood, Cal.**

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**\$\$\$ IN Personalized Baby Record Books. Sell By Mail Use Same Literature We Do. No-Co-Ro, Oakland 6-P, Calif.**

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**HOME workers make enormous profit with ready cut kits, unusual articles direct from manufacturer. Allen Industries, Shepherd 3, Michigan.**

**BUY Wholesale thousands nationally advertised products at big discount. Sent free "The Wholesale Plan." American Buyers' Service, 629-T Linden, Buffalo, N. Y.**

**HOW to get your mail order advertising Free revealed by famous expert. Also other "Inside" secrets. Free details. Benson Barrett, 1751-B Morse, Chicago 26.**

**BE Self Employed—Details—Boyen, 51-56 48th Street, Woodside 77, New York.**

### 39 FORMULAS, PLANS, ETC.

**FORMULAS**—All kinds. Latest products. Literature free. Kemico. Park Ridge 15. Ill.

**FREE** Formula Catalog anything analyzed \$25.00. Western Chemical. Salem. Oregon.

**LABORATORY** tested formulas. Lists free. Pont. Box 635-PS. Terre Haute. Ind.

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**NEW** liquid casting plastic. Clear, colors. Embed flowers, insects, coins. Saw, drill, carve. Send 25c for Wholesale Catalog and New Sales Manual showing how to make money at home. Castolite. Dept. G-102. Woodstock. Illinois.

**MATERIAL & Supplies**. Gold. Silver. Brass Chain and Findings. Free lists. Dept. S-2. Caraday. Box 71. Ryder Sta., Brooklyn 34. N.Y.

**PLASTIC** Sheets. Rods. Tubes. etc. Free List. Plastic Supply Co., 2901 N. Grand Blvd., St. Louis 7. Mo.

**NEW** carving manual, material catalog. 50c postpaid. Plastic's. Box 1812. Salt Lake City 10. Utah.

**PLASTICS** Catalog—10c. Sheets, rods, tubes, molding, casting plastics, information, bargains galore. Sample low price: Gem-O'-Lite Clear Casting Plastic, gallon \$7.95. Gem-O'-Lite. Box 686D. North Hollywood. California.

### 41 CHEMICALS & APPARATUS

**LUMINOUS** Paints will glow in dark. Six colors. Fairmount Chemical Co., 136 Liberty St., New York City 6.

**NEW** Idea Chemical and Apparatus Outfits for Home Experimenting. Photo-Scales. Microscopes. Chemicals. Biological and Laboratory Supplies in Small Quantities. Catalog 25c. Established 1931. John H. Winn. 124-B West 23rd Street. New York 11. N. Y.

**ILLUSTRATED** Catalog: Chemistry, mineralogy, biology. 10c. Tracey Laboratories. Evanston. Illinois.

**CHEMICALS** and apparatus for industrial, analytical, and private laboratories. Catalog 20c. Dept. M-26. Biological Supply Co., 1176 Mt. Hope Ave., Rochester 20. N. Y.

**BRAND** New. Spectacular Chemical and Fireworks Manual. Complete set-ups and instructions \$1.00. Chemi-Tech Laboratories. 568 Riley. Buffalo 8. New York.

**COMPLETE** Electroplating outfit for less than five dollars. All equipment and chemicals. Free literature. Write: Simichrome Products. Box 260. Dallastown. Pa.

### 42 HELP WANTED

**FOREIGN & Latin American** Employment 1952 "Foreign Service Directory" gives Up-To-Minute Facts on Military & Civilian Construction, Government Jobs, Major Oil Listings, Aviation, Transportation, Steamship Lines, Mining, Importers, Exporters, How-When-Where to apply, application forms, Hot List Firms Hiring. \$1.00 post-paid. Global Reports. P.O. Box 883-S. Hollywood 28. Calif.

**FOREIGN** Employment Construction men, building trades, helpers, office men, others, interested in Foreign Projects. High wages, quarters, transportation. Send \$1 for Foreign Construction Compendium and Application Forms. Foreign Service Bureau. Dept. PS-6. Metuchen. New Jersey. (Not an employment Agency—no fees.)

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**IMMEDIATE** openings offered—Honolulu. Help wanted columns airmailed \$1.00. Pomeroy's. =3 Campbell Block. Honolulu. Hawaii.

**ALASKA**—Last American Frontier. \$1.00 brings 1952 Business Directory, Government Map, Construction Projects Military & Civilian, Homestead & Highway facts, Hunting-Fishing-Game Rules, Mining, Aviation, List of firms hiring, How-When-Where to apply. Alaska Opportunist. P. O. Box 883-S. Hollywood 28. California.

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**ANCHORAGE**, Alaska. Help Wanted. construction, wage, rental information air mailed \$1.00. Weyand. 1501 11th Avenue. Anchorage. Alaska.

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**FAST** sellers. Big demand. Catalog. Parker Drug Co., Hoboken 6. New Jersey.

**NEW** Jobs open in selling! Send name, address for five free issues of Opportunity Magazine's money-making guide, listing hundreds of companies who'll pay you well, full or part-time. No experience needed. Opportunity. 28 E. Jackson. Dept. 18. Chicago 4. Illinois.

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**WANT** to make real money? You can positively make \$50.00 a day and up selling a brand new item going to every type of Food and Beverage Store, Factories, Laboratories, Hospitals, etc. First time advertised. Samples furnished. Utility Durawear. 53 West Jackson Blvd., Dept. PS-6. Chicago 4. Illinois.

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**NEW** Plastic Mending Tape. Just press on! Repairs clothing instantly. Lightning seller. Samples sent on trial. Kristee 148. Akron. Ohio.

**NEED** Extra Cash? Take orders for personal initialed belts and buckles, cap badges, tie holders, etc. Choice of 3000 emblems. Free sales kit. Hook-Fast. Dept. 1425PS. Providence. R. I.

**BIG** profits selling ties. (\$2.00 values) \$6.50 dozen. Free catalog. Empire Cravats. 648A Broadway. New York 12.

**BIG** Daily Profits—Selling Uniforms, Shirts, Caps, Ties, Wallets, Initialed Buckles, Belts, Badges, Choice 3000 Emblems. Free Sales Kit. Hook-Fast. Box 480PS. Roanoke. Virginia.

**AMAZING** Miracle Auto Polish—Plas-tone! New scientific discovery contains pure Carnauba Wax. Genuine Plastic plus Silicones! Sensational money maker! Nationally advertised! Sold by leading firms. Used by America's largest organizations. Only \$1 retail 100% profits. Sales experience unnecessary. Exceptionally easy sales. High repeat sales. Choice protected territories. Once in a life time opportunity for large steady earnings. Only limited number of agents accepted. Write Today. Plas-tone Company. 2950 W. Grand. Dept. PS-6. Chicago 12. Illinois.

**AMAZING** but true! We pay you daily cash for giving women privilege wearing wonderful nylon stockings at our risk. These beautiful sheer nylons cost nothing unless satisfactory! Yet, you get advance cash plus huge bonus that increases your earnings by 40%. Postcard brings you free sample stocking and complete money-making outfit. No obligation. Kendex. Babylon 94. New York.

**CALENDARS**. Advertising Novelties. Matches. All styles, including Religious, Varnished. 12 Sheet. Girls. Hundreds of Advertising Novelties, Book Matches, etc. Fleming Calendar Co., Promotional Division. 6539 Cottage Grove. Chicago 37. Ill.

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**MEXICAN** Feather Pictures. Sell on sight; 200% profit! Free details. Sample 20c stamps. (No Coins). Sylvias. Apartado 9036. Mexico City.

**ANYONE** can sell Hoover DuPont Nylon Uniforms for beauty shops, waitresses, doctors, nurses, others. In white and colors. Exclusive styles. Top quality. Low priced. Exceptional income. Real future. Equipment free. Write fully. Hoover. Dept. F-101. New York 11. N. Y.

**GOLD** Lacquered and silver sign letters. Windows, doors, trucks. Standard Sizes. Penny and up. Samples. Atlas G. 544 West 79th. Chicago 20.

**CALIFORNIA** sweet smelling beads, sensational sellers. Particulars free. Mission. 2328P West Pico. Los Angeles 6. Calif.

**YOU** will make more money day after day, year after year, selling DuPont nylons priced to sell and repeat. Details Free. Write today. Arch Hosiery, 104 N. Fifth St., Phila. M6. Penna.

**IS** \$210, a week worth a postcard to you? Then rush card with name and address for special Free Trial Plan that sells amazing new Automatic Refrigerator Defroster "like hot cakes!" Write to Mr. Lewis. D-Frost-O-Matic Corp., Dept. J-103, 173 W. Madison. Chicago 2. Illinois.

**MAKE** Extra Money—for yourself, club or church. Up to 100% profit selling big value Christmas. All-Occasion greeting card assortments to friends, neighbors, 7 leading 21 card \$1.00 boxes, Religious and Novel cards, Gift Wrappings, Ribbons, Stationery, Napkins, Animated Books, Sewing Kits, unusual gifts. Over 150 items. Bonus plan. Experience unnecessary. Write for samples on approval. Special Offers. Hedenkamp. 361 Broadway. Dept. PS-18. New York.

**SELL** DeLuxe electric shavers. Sample \$2.95. Guaranteed. Turner Sales Company. 246-B Fifth Avenue. New York 1. N.Y.

**START** Your Own Business on credit. Your own boss. 1586 of our Dealers sold \$5,000 to \$27,500 in 1951. We supply stocks, equipment on credit, 200 home necessities. Sales experience unnecessary. Pleasant, profitable business backed by world-wide industry. Write Rawleighs. Dept. F-U-PSC. Freeport. Ill.

**GET** Into Toys! Big Money. Show Free toy-gift line full or spare time. Take orders, pocket juicy profits. Styleco. Dept. E251. Cincinnati 10. Ohio.

**AMAZING** new seller! Chenille rugs and bath mat sets personalized with woven-in names and monograms. All colors. Low priced; big commissions. Miniature Sample Rug and Sales Kit free. American Mills. Dept. 509. Indianapolis 7.

**COUNTY** Agency. Power mowers—\$41.90. Delivered. Appoint dealers-agents. Rotacut-52. Excelsior Springs. Missouri.

**STOP** oil pumping! Restore compression! 200,000 mile guarantee! Only \$3.00. Nerlind. Box 7. Inglewood. Calif.

**GET** Into Million Dollar Work Clothes Business! Earn big money now, unlimited future! Sell finest-quality embroidered uniforms and work clothes to factories, garages, service stations, lumber yards, everybody! Huge profits possible. No experience needed. Gorgeous selling kit, actual fabric samples, everything Free! The Topps. Dept. 546. Rochester. Ind.

**SELL** Handicrafts to shops. Trial 3 months. Bulletins. \$1.00. Homeworkers Guild. Madison. Minnesota.

**I** need 500 Men to wear Made-To-Measure suits and earn up to \$15.00 in a day showing friends and taking orders. Write for Free Outfit. Progress Tailoring Co., 500 S. Throop St., Dept. G-221. Chicago 7. Ill.

**MEXICAN** feather pictures. Unusual novelty \$1.00 (stamps) brings \$2.00 worth samples, refunded if unsatisfied. Aztec Art-S. Apartado 762. Mexico City.

FREE Book where to buy 800,000 articles from manufacturers at Wholesale Prices. Save up to 50% on Nationally Advertised Merchandise. Rush name for Free copy. Glass Pub. Co., Ellwood City 1, Penna.

WHOLESALE—Hottest novelty cards on the market today. Sample and catalog 10c. Ray Daum, 204 Hiddeson, Greenville, Ohio.

BUY Wholesale thousands nationally advertised products at big discount. Sent free "The Wholesale Plan." American Buyers' Service, 629-T, Linden, Buffalo, N. Y.

FREE book "505 Odd, Successful Businesses." Work Home! Expect something Odd! Pacific-38C, Oceanside, Calif.

TRICK Billfold hot sample \$1.00, \$7.20 Dozen. Twisto, 716 Pine, St. Louis, Mo.

#### 44 HIGH-GRADE SALESMEN

ADVERTISING book matches—Cash in on big demand—sell Union Label matches. Cuts for all businesses and political parties—Free powerhouse selling kit—low prices—protection guaranteed on repeat orders—Cash commissions, Superior Match Co., Dept. P-652, 7530 Greenwood, Chicago.

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MAKE \$3000 next 60 days—selling 1953 calendars, advertising specialties and executive gifts line. Season on. Big commissions advanced. Outfit free. Meyerson Calendar, 605-PS Washington, Chicago 6.

BIG Paying Repeat Business. Need men for nationally known concern to serve Contractors, Freight Lines, Gravel Companies, Farmers, Industrial Plants and other heavy equipment users, with top quality heavy duty lubricants. Join our top producers earning \$10,000, and more, each year. Earnings in advance, free sample kit, no collection or delivery worries. Write E. J. Baker, Sales Department, Box 676, Dayton 1, Ohio.

SIDELINE for energetic salesmen—sell advertising specialties, calendars. Earn \$500.00 monthly easy. Big commissions advanced, bonuses. Samples furnished. Continental Calendar, 542-M So. Dearborn, Chicago.

AD Matches! Sell Amazing Designs—20, 30, 40 and 240-light book matches. Biggest spot cash commissions; every business a prospect. Low prices for high quality. Repeats. Start without experience; men, women; full, part time. Buy Nothing! Sales kit furnished. Match Corp., Dept. PS-30, Chicago 32, Illinois.

#### 45 EDUCATIONAL & INSTRUCTION

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USED Correspondence Courses and Books sold and rented. Money back guarantee. Catalog free. (Courses Bought.) Lee Mountain, Pisgah, Alabama.

TIRED Of No Money, second rate jobs? Like to start a real career with a lifetime of high salaries? Write me about two growing fields that really need men. Ed. Howes, Chief, National Schools, 4000 S. Figueroa Street, Los Angeles 37.

HIGH School—No Classes, Study at home. Spare time. Diploma awarded. Write for Free catalog. HBA-13 Wayne School, 2527 N. Sheffield, Chicago 14, Ill.

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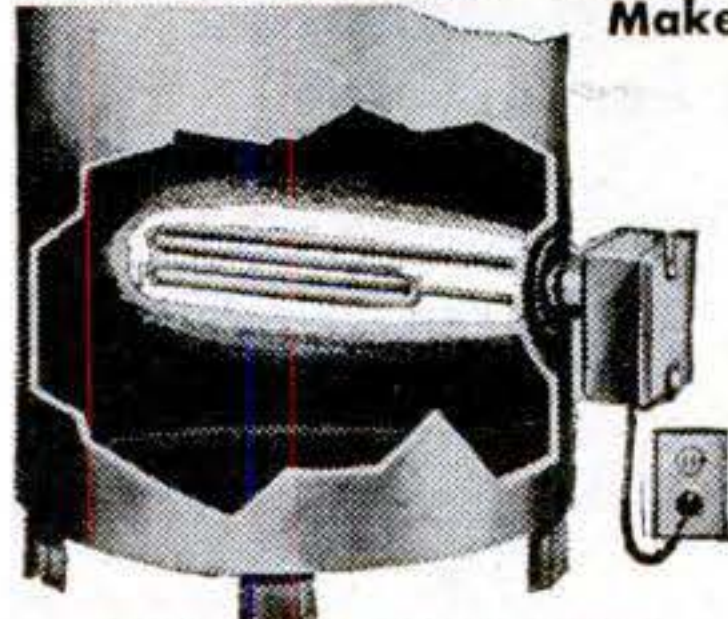
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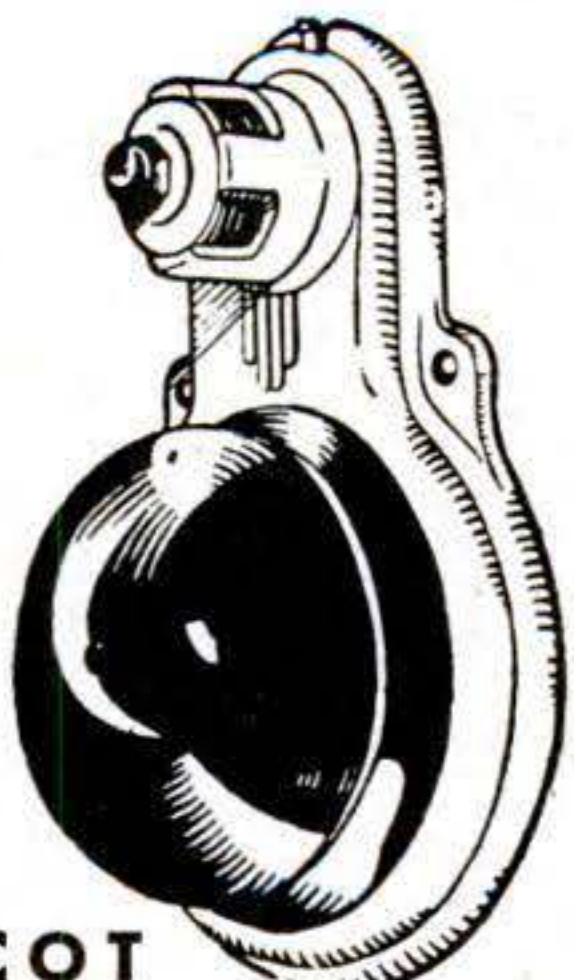
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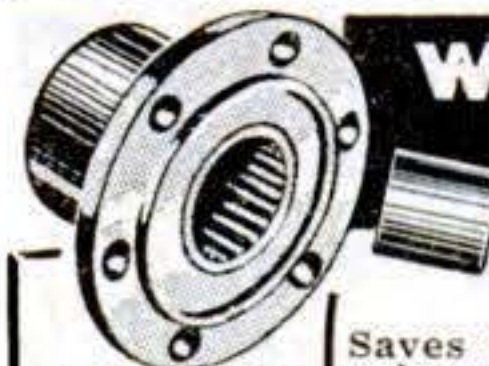
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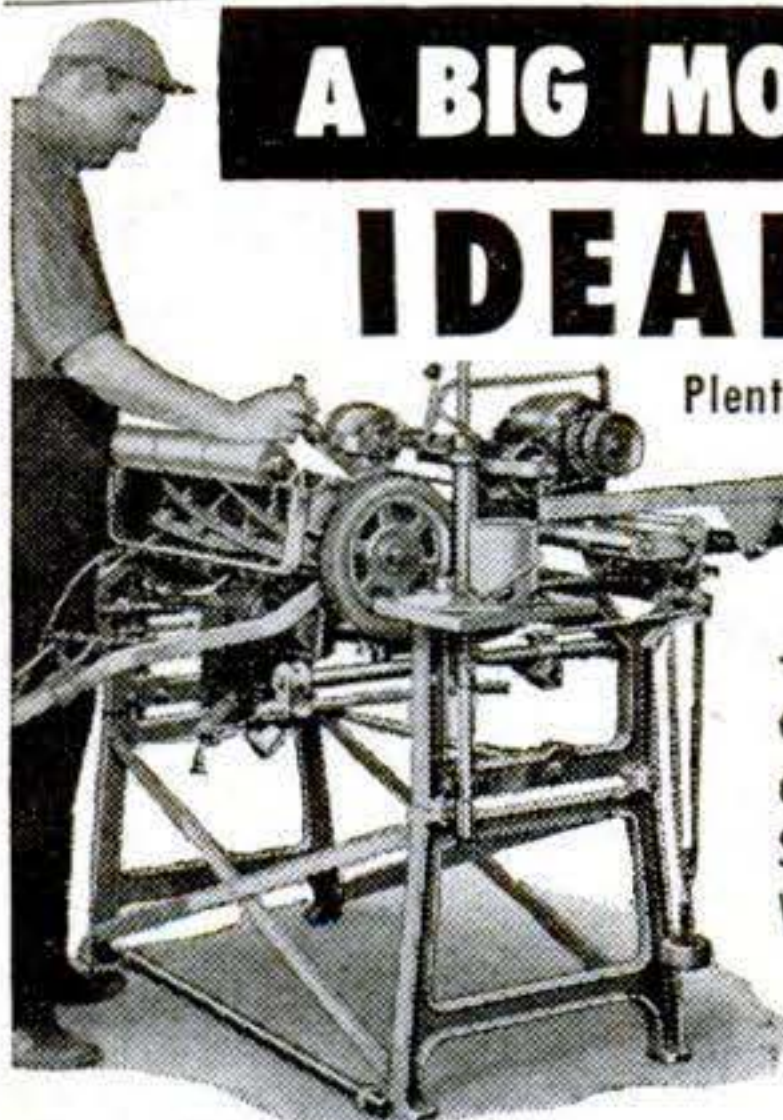
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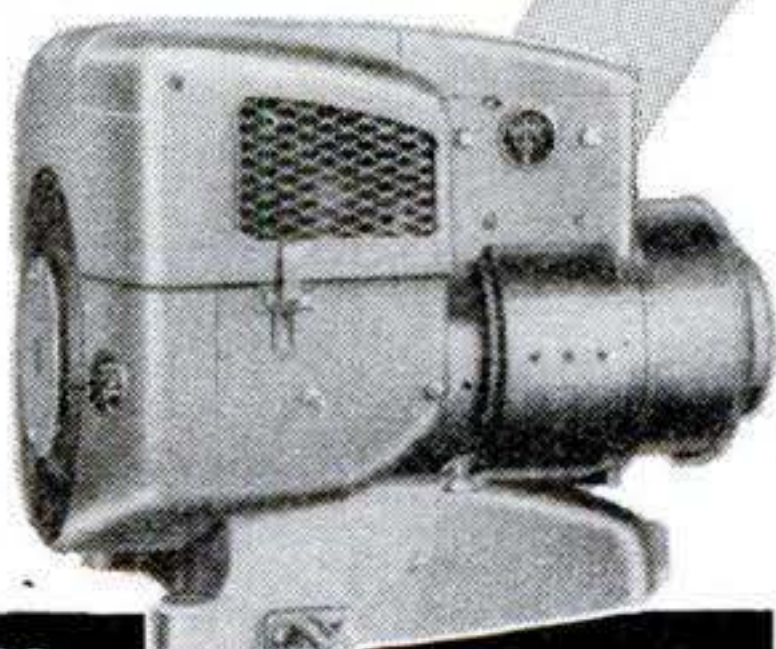
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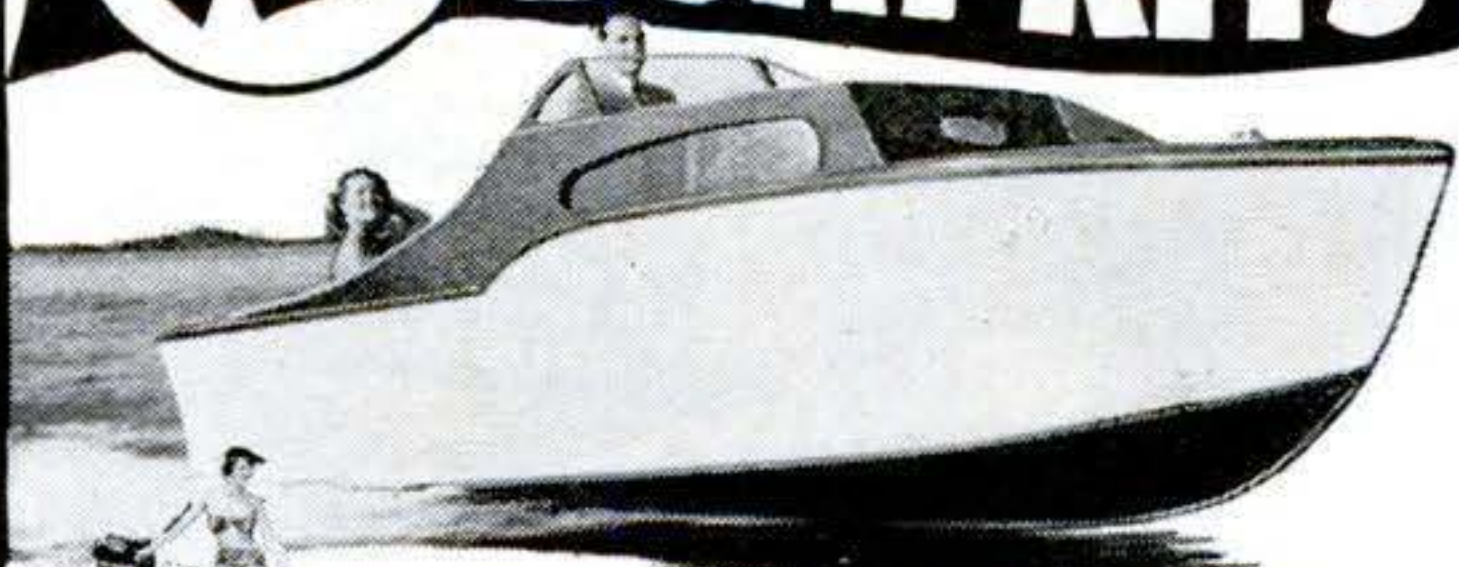
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24	4.50 6.50	4.00 5.50	1/2, 5/8, 3/4

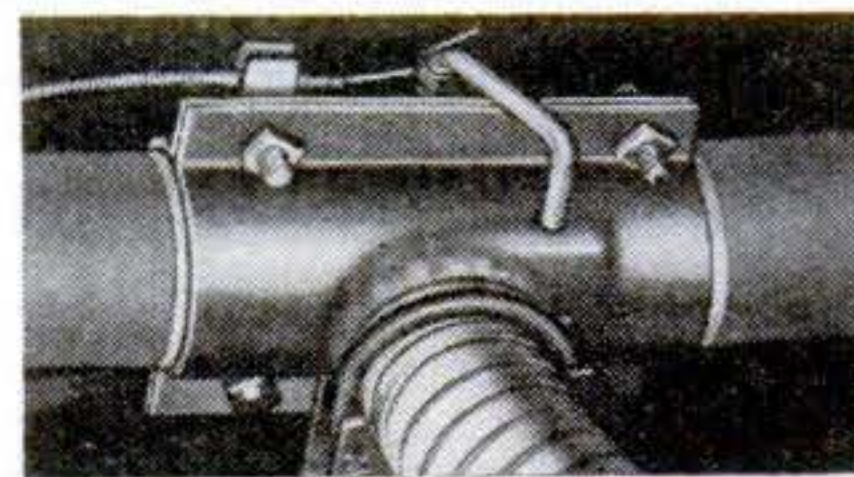
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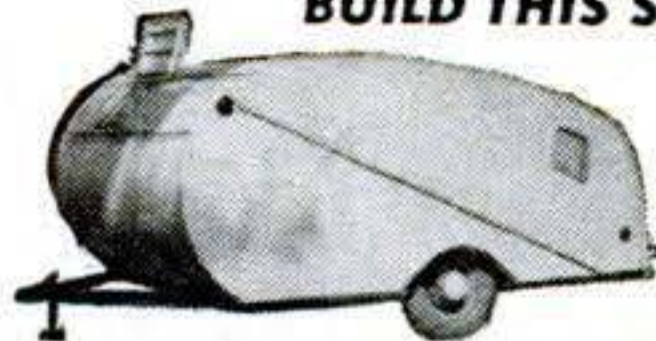


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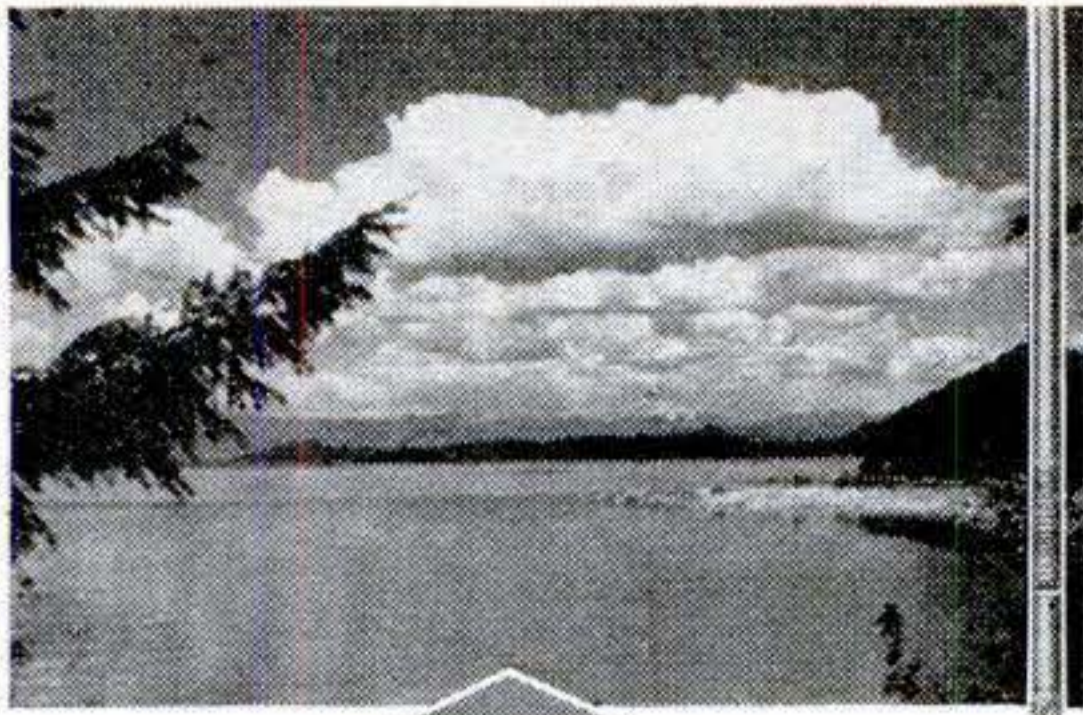
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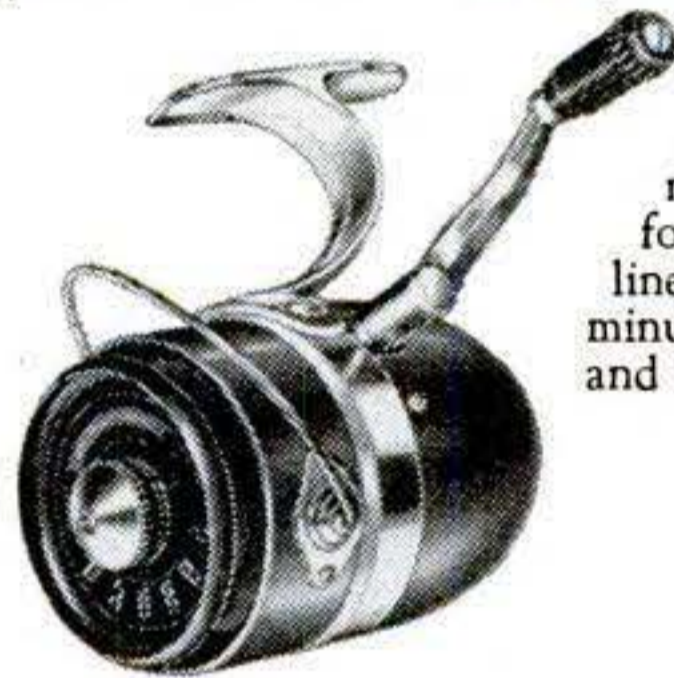
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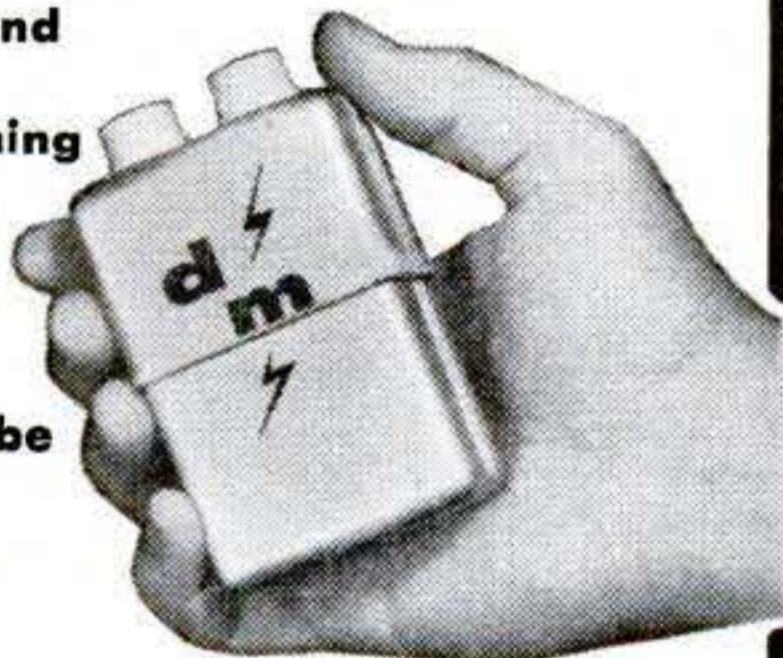
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SEA-HORSE 25  
\$390\*

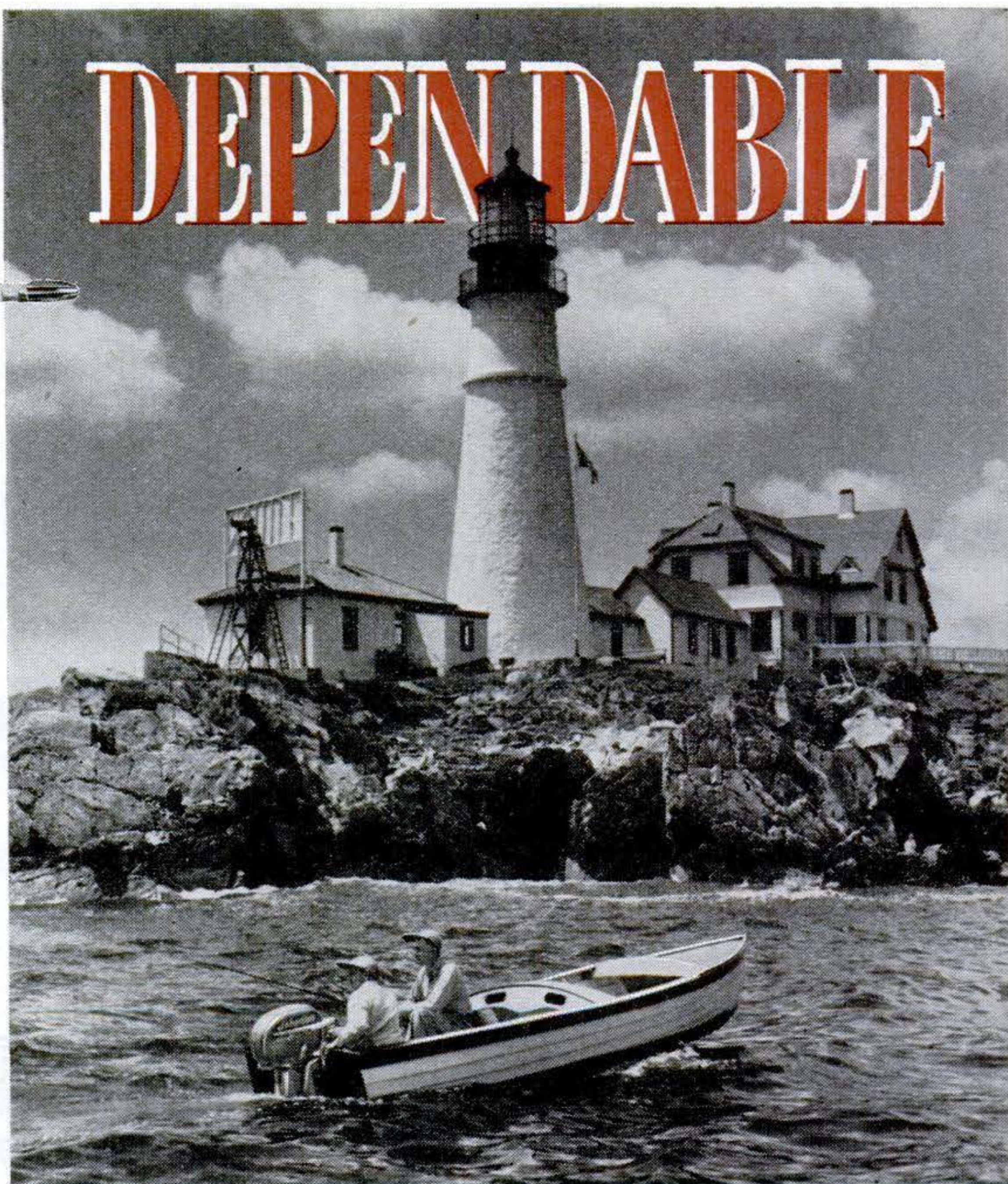
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PORTLAND HEADLIGHT

They're smooth—these ultra-modern Sea-Horse motors—smooth in their entire performance range. They're swift and sure as they reel off the miles, yet they'll hold a lazy trolling pace all day long if you wish. They *start*. No gas engine of any type starts so easily . . . They're a joy to handle, with Gear Shift (or Neutral Clutch). And they're *rugged* . . . No wonder more fishermen own Johnson outboard motors than own any other make—76% more! No wonder the nation's automotive engineers show the same preference—by 82%! There is a size for every outboard need—from canoe to cruiser. Ask your Johnson dealer. Look for his name under "Outboard Motors" in your classified telephone book.



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**FREE!** The new edition of the Sea-Horse Handy Chart describes the 1952 Johnson Sea-Horses in detail. Write for it!

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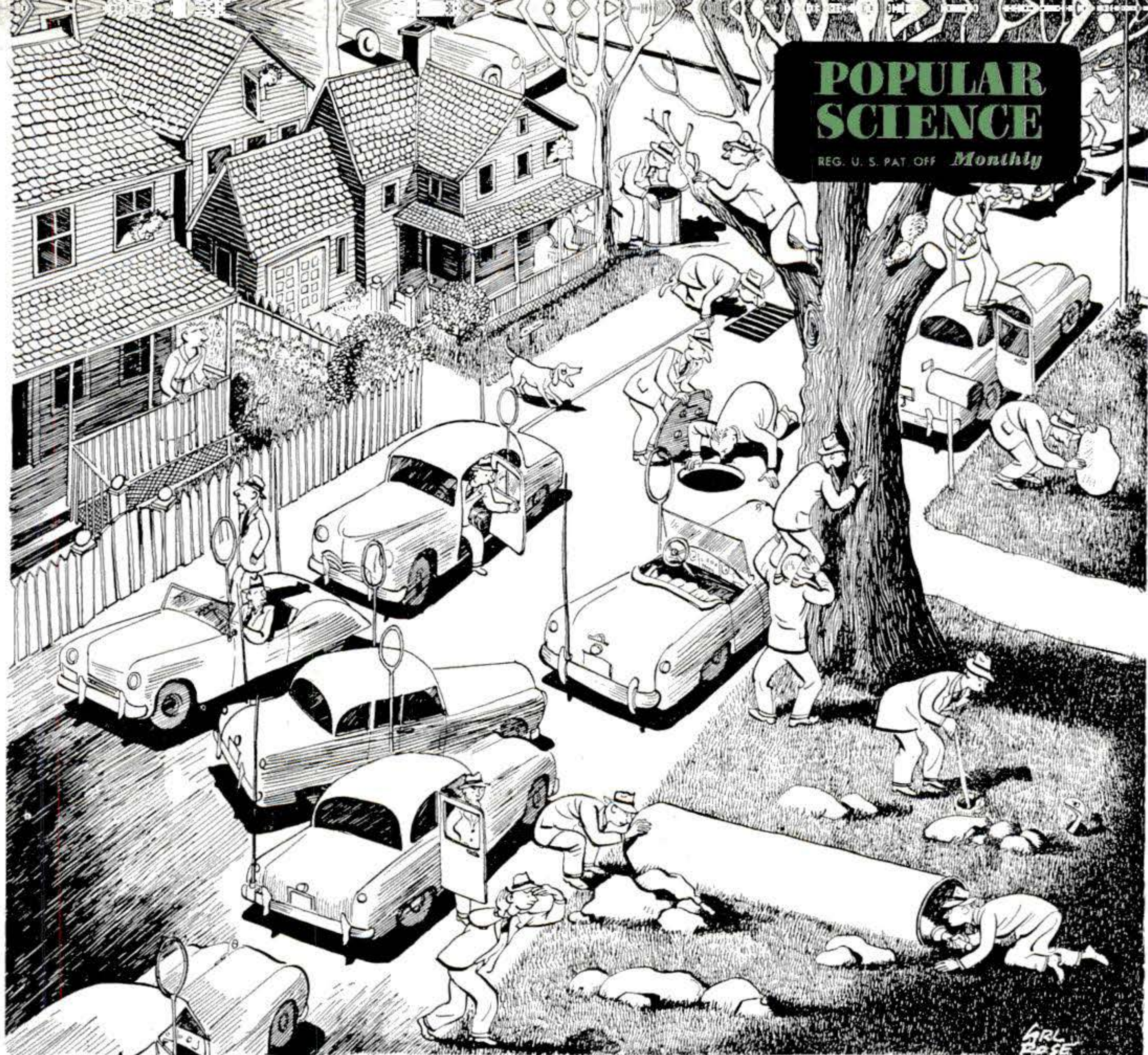


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In commercial fishing, in logging, in petroleum production, in work-boat operation of all kinds, Johnson Sea-Horses are used by the thousands—because they give flexible, low-cost, **DEPENDABLE** service. (The lobsterman shown here drives a Sea-Horse 25.)



**Radio hams train themselves to serve their community in a disaster by weekly hunts for hidden transmitters.**

# They Play Cops-and-Robbers on Wheels

**By Don Holm**

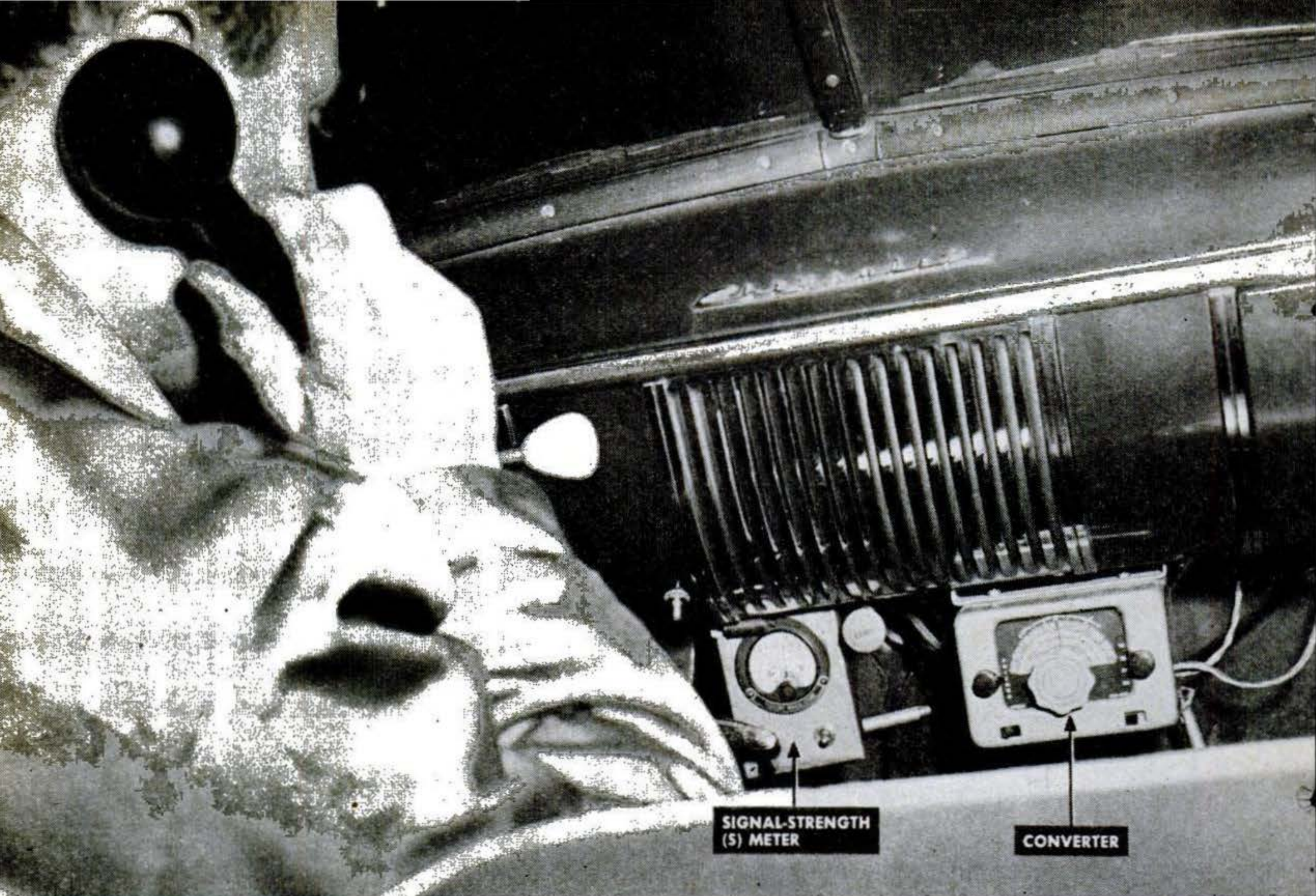
**D**RIVE into Portland, Ore., any Thursday night and you stand a good chance of getting caught in the middle of what looks like a large pack of police patrol cars hunting for someone to pinch.

What's actually taking place is one of the screwiest cops-and-robbers games ever played on wheels. The "cops" are 40 to 60 ham radio operators in their radio-rigged

cars. Their quarry is a transmitter hidden somewhere in Portland's 67 square miles of streets, alleys and waterfront.

The obvious point of the exciting game is to test the hams' ingenuity and gear. But there is a more serious purpose, too.

If an A-bomb explosion should suddenly shatter downtown Portland, rescue forces would desperately need radio communications in a hurry. If saboteurs with secret transmitters were attempting to disrupt



Rounding up hunters for the chase, the emergency coordinator talks to each one by radio.

**OFF TO BEAT THE BUSHES**, a ham hot on the trail of a hidden transmitter leaves his car behind. With the quarry's signal extra-loud, he knows the transmitter is close.



those communications, it would be imperative to track them down as swiftly as possible.

Many of the ham operators who comb Portland for the source of mysterious radio signals each Thursday night have already proved their value in an emergency. They did vital and often dangerous communications work during the 1948 Vanport flood, which wiped out a war-born city of 30,000.

The hams belong to an organization called the 29.3 Mobile Net, so named for the frequency of 29.3 megacycles, in the 10-meter band, that they use. Typical members are a doctor, a couple of manufacturers, a carpenter, an electrician, a laborer, a student, a lawyer or two. Only a few are professional radiomen. Their cars range from a beat-up jeep, with a war-surplus dynamotor mounted on the back seat, to a 1952 Oldsmobile, with its sleek pastel hide punctured by an eight-foot whip antenna.

Earl Ashe, W7AIZ, one of the organizers of the net, and his wife, Orene, took me along on a recent hunt. They picked me up in the northeast section of the city about 7:15. We parked to wait for the zero hour.



**Transmitter in hidden car (right) was tracked down with the help of revolving loop antenna.**

Under the dash, the green light of a six-watt transmitter glowed like a cheery eye. Alongside it was an illuminated S-meter, which measures relative signal strength—stronger as you approach the source, weaker as you go away from it. The needle bounced back and forth as Earl tuned across the band to “read the mail” of amateurs in other parts of the country.

Promptly at 7:30 Earl tuned to our frequency. We assembled the small directional loop and switched the lead-in from the regular whip to the loop.

We were just in time to tune in on Ed Marvin, W7HIA, who, as emergency coordinator, was parked on top of fortress-like Rocky Butte, checking in amateurs waiting in cars all over the metropolitan area. When Ed came to us, Earl pressed the button on his hand mike, the receiver went dead, and the red light of the transmitter flashed on.

### ***The Chase Is On***

“W7HIA from W7AIZ mobile,” he called out. “No traffic. We’re rarin’ to go, Ed.”

Routine business dispensed with, Ed said, “If there are no more check-ins or

traffic, we’ll begin the weekly hunt. Hidden transmitter for tonight is W7AKQ. Take ’er away, Verne!”

Verne Bamber, who had spent all week looking for a hiding place—not even the coordinator knew what location he had chosen—had been taking down the names at roll call. Now he came on the air. His signal was weak, indicating he was going to be tough to find. He started calling the roll, each amateur in turn, for a brief transmission.

Meanwhile we turned our loop and watched the S-meter for maximum signal strength. We got a bearing that indicated Verne’s signal was coming from either the southwest or northeast—a loop antenna tells only the axis along which a signal is coming, not the compass direction of the source; that’s a matter of trial and error. We decided to try southwest.

“W7AIZ from W7AKQ mobile. How’re you doing, Earl?” we heard Verne say.

Earl laughed into the mike. “We got a bead on you, boy. Consider yourself caught.”

The excitement of the hunt began to take hold. We headed west. The sky was

still light enough for us to see the scudding dark clouds overhead. A light rain began to fall.

We listened as Verne continued to call the roll, bantering with the hunters, egging them on. We knew that the other mobiles were ranging from the dikes along the Columbia River bottoms to the virgin fir forests of the West Hills and the dark labyrinth of the Willamette River waterfront.

Most of the mobile rigs are home-built affairs, made from war-surplus parts, although commercial jobs costing as little as \$30 are popular. For receiving, the regular car set is used, with a short-wave converter. The hams usually use an eight-foot whip tuned to the frequency, but when the hunt starts some of them switch to portable loop antennas, built out of tubing with coaxial cable inside and tuned with a small variable condenser.

### *Signal Drops—Wrong Direction*

As the Ashes and I continued westward, we found Verne's signal dropping down into the mud of ignition and power-line noise.

"W7AIZ from W7AKQ. Wha' hopped, Earl?" Verne jibed. "I thought you had a bead on me."

"We're coming," Earl promised. "How's my signal?"

"About an S-seven or eight," Verne replied.

That meant moderate strong to strong. But we didn't pay much attention to it. A favorite trick of the hidden transmitter is giving false signal reports. Sometimes, too, the quarry transmits with his loop instead

of his whip, turning it around after each broadcast and thereby sending out different and confusing bearings. There are only three rules: You have to stay within city limits, you cannot trespass or hide on private property and, except for the last few feet of the chase, you have to be on wheels.

### *Hot on the Trail*

We pulled up to the curb on a ridge and took another bearing. This time Verne's signal was stronger and seemed to be in an east-west direction. The receiver was crackling with mock complaints, bantering and the squawks of other hams. One of them sped past us, going in the opposite direction. Earl signaled him in code with the car horn that he was going the wrong way.

More than an hour had passed and we were now in the northeast district. We noticed for the first time that other mobiles were concentrated there, too. Narrowed down to one sector, the hunt was becoming intense. I hadn't had so much fun since I was a kid playing run-sheep-run.

We headed east, certain that we had a couple of miles to cover before we got in range. Verne's signal was growing much louder and we knew we were getting hot. We followed the others in a southeasterly direction for a mile and then lost them in heavy traffic. We began to climb uphill through a dark residential district. Verne was louder than ever and his voice taunted us. We turned a corner and suddenly came upon a group of mobiles who had converged

*[Continued on page 216]*

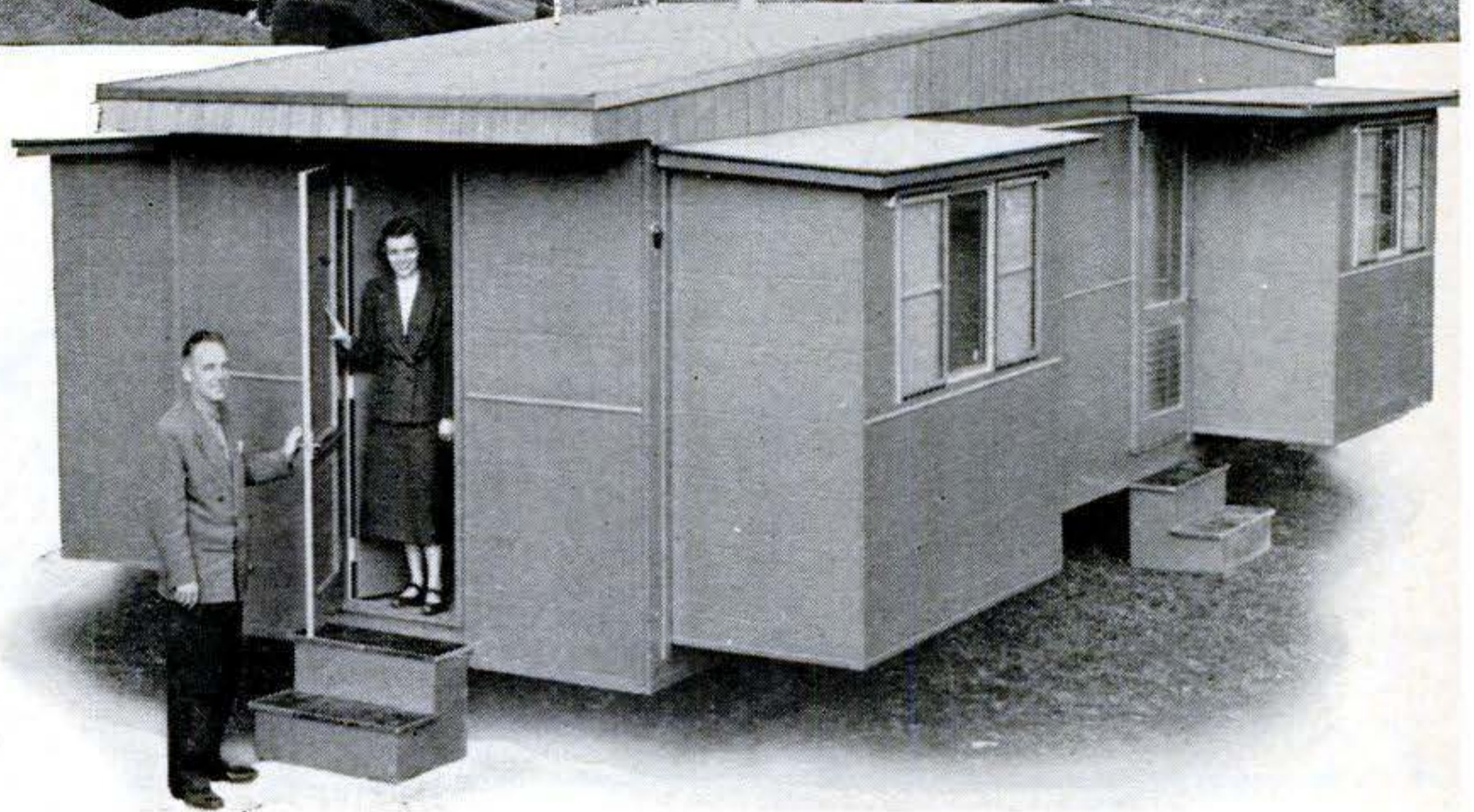
**AT THE END OF THE CHASE,** hunters park their antenna-waving cars and repair to a nearby

eatery for food and talk. Their weekly game is important training for civil-defense work.





**JACKED UP** on special four-wheel chassis, the house (left above) trails along wherever you go. With chassis removed, house expands to provide four rooms and bath (right).



### Moving? Take the House, Too

HOUSING shortages in boom towns and army camps won't dismay a family that calls this mobile house home. When pulled on the road as a trailer, it is only 32 feet long and eight wide. But on arrival at a new site,

its living space is increased to 400 square feet by four pull-out bays.

Designed by Carl V. Bergstrom, the house costs about \$6,000. Knox Corp., Thomson, Ga., and Gresham Construction Co., Santa Clara, Calif., are the builders.



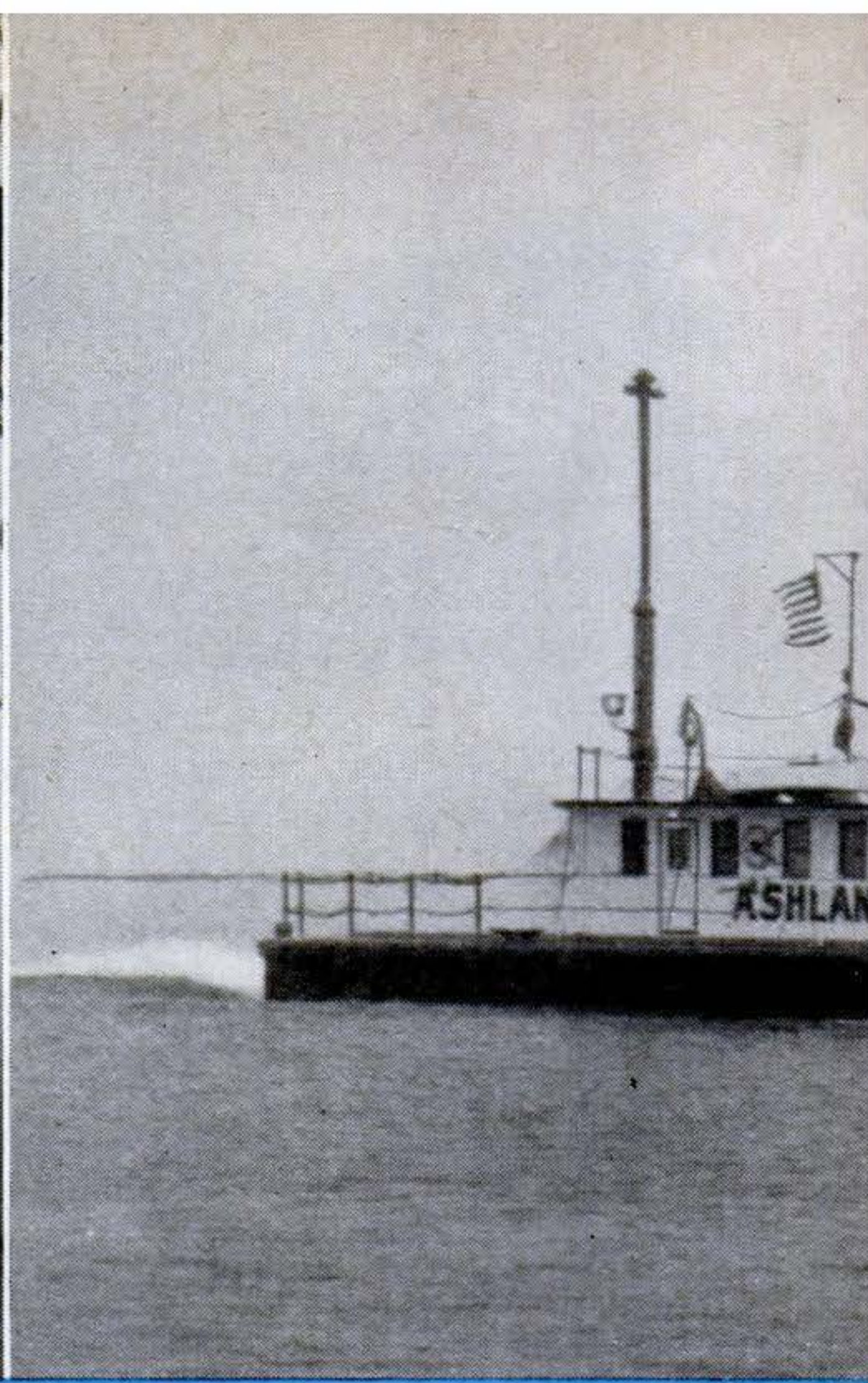
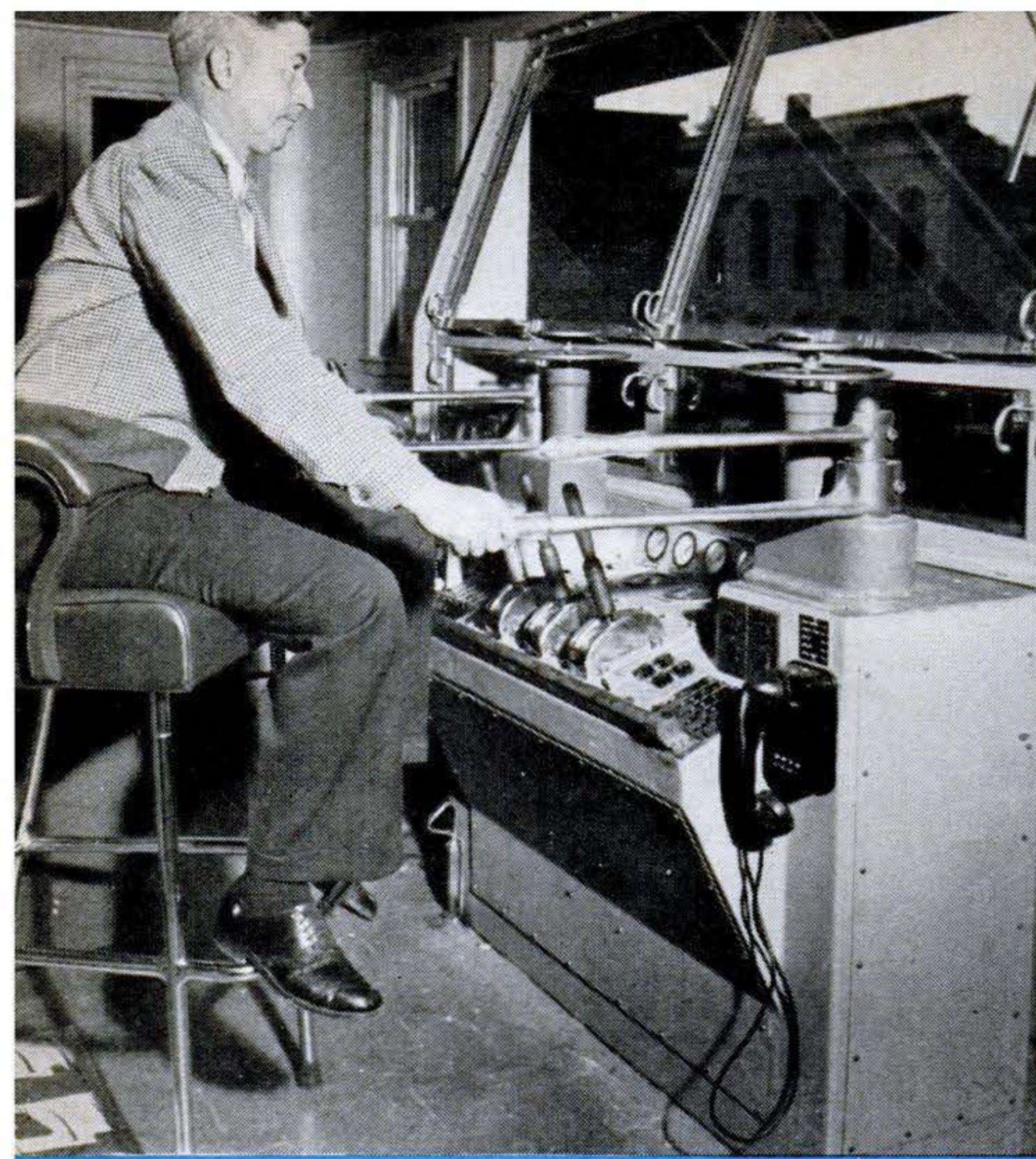
### Ranch Plane Mounts Shotgun

BOB MASTERSON, Paducah, Tex., rancher, strafes coyotes and eagles that prey on his livestock, using a shotgun mounted on the landing gear of a Piper Cub. Just like a fighter pilot, he aims the plane itself. The gun fires below the propeller.



### Window Swings in to Clean

THIS window has sash that slide up and down in the usual manner but also can be swung inside the room for cleaning. A full length hinge on one side of the sash also acts as a slide for raising or lowering the sash. A tab on the other side of the window locks it. The window is marketed by Etling Window of Barberton, Ohio.



ONE OF NEWEST Mississippi towboats is the big, triple-stacked *Aetna-Louisville*. Pilot-

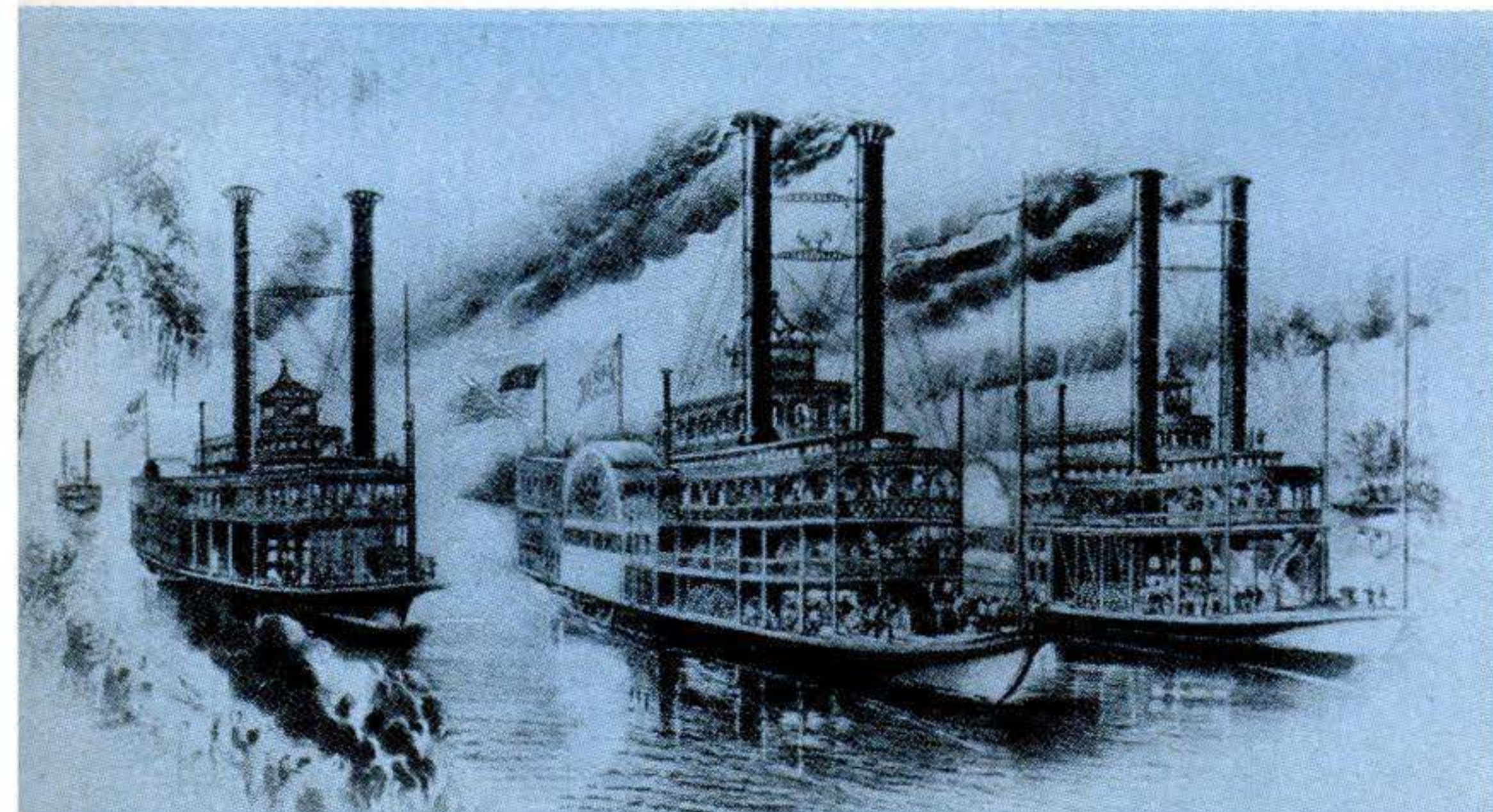
house (Capt. R. L. Smith at the controls) features radar, radiophone, supersonic depth

# Radar Conquers Huck Finn's River

By Robert Lasch

THE rhythmic song of Diesel power has drowned out the clanking of the wood-burning steam engine on the broad waters of the Mississippi.

The gaudy, twin-stacked steamboat of Mark Twain's day, with its gingerbread trim and spray-tossing paddle wheel, has given way to the streamlined hull of the 20th Century tug, packed with the power of 3,000 oil-fed horses and propelled by



**STEAMBOAT RACING** was all the rage when Currier & Ives made this lithograph — "Champions of the Mississippi"—back in 1866. From New Orleans to St. Louis, cheering thousands lined the river banks as the paddle-wheelers churned past, jet black plumes of smoke streaming from their tall stacks.





recorder. Crew's quarters boast fluorescent lighting, air conditioning and TV. Three

1,600-hp. Diesels drive barge "train" 1,170 feet long, loaded with 26,000-ton cargo.

**Radar-equipped, Diesel-powered, even air-conditioned, the modern towboat has driven picturesque paddle wheels off Old Man River.**

variable-pitch screws of stainless steel.

This modern "towboat," which doesn't tow at all but pushes, bosses a train of barges longer than the *Queen Elizabeth*. It handles 20,000 tons of cargo—more than two good-sized seagoing freighters carry. Atop the towboat's pilothouse the radar antenna's invisible searchlight probes tirelessly through fog and darkness, giving the pilot a picture of the shore line and river that wind ahead.

**Science Tames the Mighty Mississippi**

The old-time leadsman with his sounding line, calling out the depth in risky waters, is long gone. Today's Mississippi pilot gauges the water under his keel with a casual glance at the supersonic depth recorder. And he keeps in constant touch with other boats and with his home office via radiophone, operating on a special short-wave marine channel.

Stem to stern, the transformation is com-

plete. Innovations include steel hulls, air horns instead of whistles, and fingertip controls that swing the rudders at the touch of a lever (thereby consigning to limbo the great steersman's wheel that once symbolized the river). These changes, along with tiled bathrooms and television sets, have altered the ancient and honorable art of river steamboatin' beyond recognition.

Even the river itself has changed. For one thing it is a good deal shorter. In 1883, Mark Twain in his *Life on the Mississippi* recorded the distance from New Orleans to St. Louis as 1,218 miles. Today it is only 1,049. But the current has accelerated and the channel deepened as the Army Engineers have cut through the bends and scoured out the bottom.

**Mark Twain Would Never Know It Now**

Coast Guard cutters patrol the "coast line," maintaining channel buoys and lights. Navigational data is broadcast daily by



**DWARFED BY 10 HUGE BARGES**, the towboat *Tennessee* herds its flock along the Mississippi right of way near Angola, La.



**TWO NEW TWIN-SCREW DIESEL TUGS.** Top the handsome *Lady Linda*. Bottom: the 3,200-hp. *Delta Cities* (PSM, Jan. '52, p. 108).

radio and published in a *Notice to Mariners* that is posted wherever pilots gather. In winter, helicopters spot ice jams, and tenders plow a path through the ice for the tows.

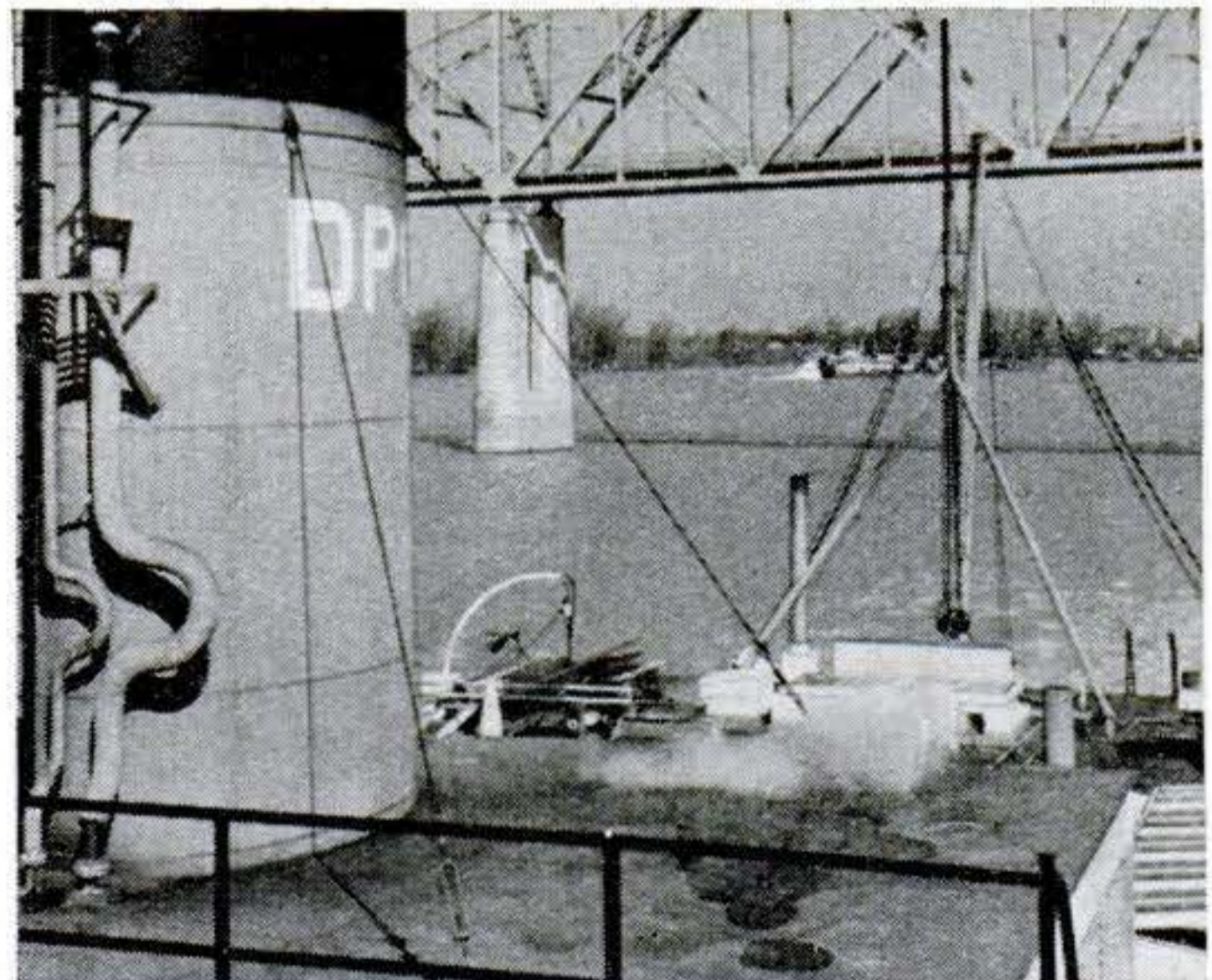
In the old days, every bend, point, sand bar and hidden snag presented a calculated risk to be overcome by the pilot's personal skill and encyclopedic knowledge of the river. Often, passengers were scalded to death or drowned when fires and exploding boilers took their toll.

Sometimes, when the Mississippi overflowed its banks, the pilot, desperate to beat out the competition, would take a chance on a short cut across what was ordinarily dry land. If the water receded too quickly or he had misjudged the depth, the unfortunate fellow experienced the humiliation of stranding his steamboat high and dry in the middle of somebody's farm.

Today, everything is business and efficiency on the great waterway, as the Gov-



**THE CHOW** is first-rate. And it should be, with galleys on most modern boats equipped with freezer cabinets, electric ranges and automatic dishwashers to ease the cook's lot.



**BRIDGES ARE THE FLY** in radar ointment. The electronic echo from their steel framework is so strong that the pilot can't "see" the piers. Radar experts hope to lick the problem soon.

ernment and private enterprise go about the serious work of moving bulk shipments of oil and coal and grain, sulfur and bauxite and steel.

### **Old Man River Hasn't Lost His Glamour**

Yet there is glory still on the river. Young men still dream of becoming Mississippi River pilots. Many a mate or engineer spends weeks on the inland waterway without seeing home, traveling as far as if he shipped to Europe and back. And if moss-hung boughs no longer brush the decks as the boat glides along a slow and lazy stream, there is compensation in guiding a priority defense cargo through a blanketing fog with the aid of the radar scope.

Nearly three-fourths of the heavy-duty towboats are equipped with radar now. The reason is economic. Just to pay the crew of a typical tow costs about \$200 an hour. Every hour the tow is tied up represents lost earning power. By using radar for running in sticky weather, the tows cut down idle time several days each month. The installation, which costs from \$7,500 to \$12,000, often pays for itself within a year.

The scope will show a buoy, an approaching boat, a drifting log, the shape of the shore line. The only hitch is bridges. Their steel framework throws back so powerful an electronic echo that the scope shows only a horizontal line, and no piers—which are what the pilot wants to see most of all.

### **"Derms" May Solve the Bridge Problem**

Experiments are now being conducted with several types of reflectors to solve this problem. One device is a "derm," which is attached to the bridge between piers. The derm retains the radar pulse momentarily by running it through a coil, then sends it back to the boat slightly delayed. It shows on the scope as a pip above the line of the bridge, and the pilot steers for that.

Depth recorders are virtually standard equipment on big boats in the lower river and are being installed on most new vessels both in the upper and lower reaches. The "ear" is attached at the head of the string

of barges, and records depth on a cylinder of graph paper in the pilothouse. Thus the pilot has a continuous record of the river bottom before him.

River men are of two minds about the automatic pilot, which has been tried out by various operators. Some favor it, some do not. The gyro pilot can only set a course and hold it. That is useful in open sea, but the river has so many bends that a fixed course is seldom held for long. Some pilots would rather steer than constantly change the gyro setting.

Typical of the newest boats is the *Bruce Arthur*, owned by the A. L. Mechling Barge Lines, which plies the Illinois waterway. This is one of the first river boats to be equipped with Diesel-electric drive, the type used in a streamlined locomotive. Diesel-electric is expensive, but its flexibility and ease of operation,

combined with a potentially lower upkeep cost, recommend it. With Diesel-electric drive the pilot can shift from full speed ahead to full astern in five seconds. It also gives extremely sensitive control over the speed of the propeller.

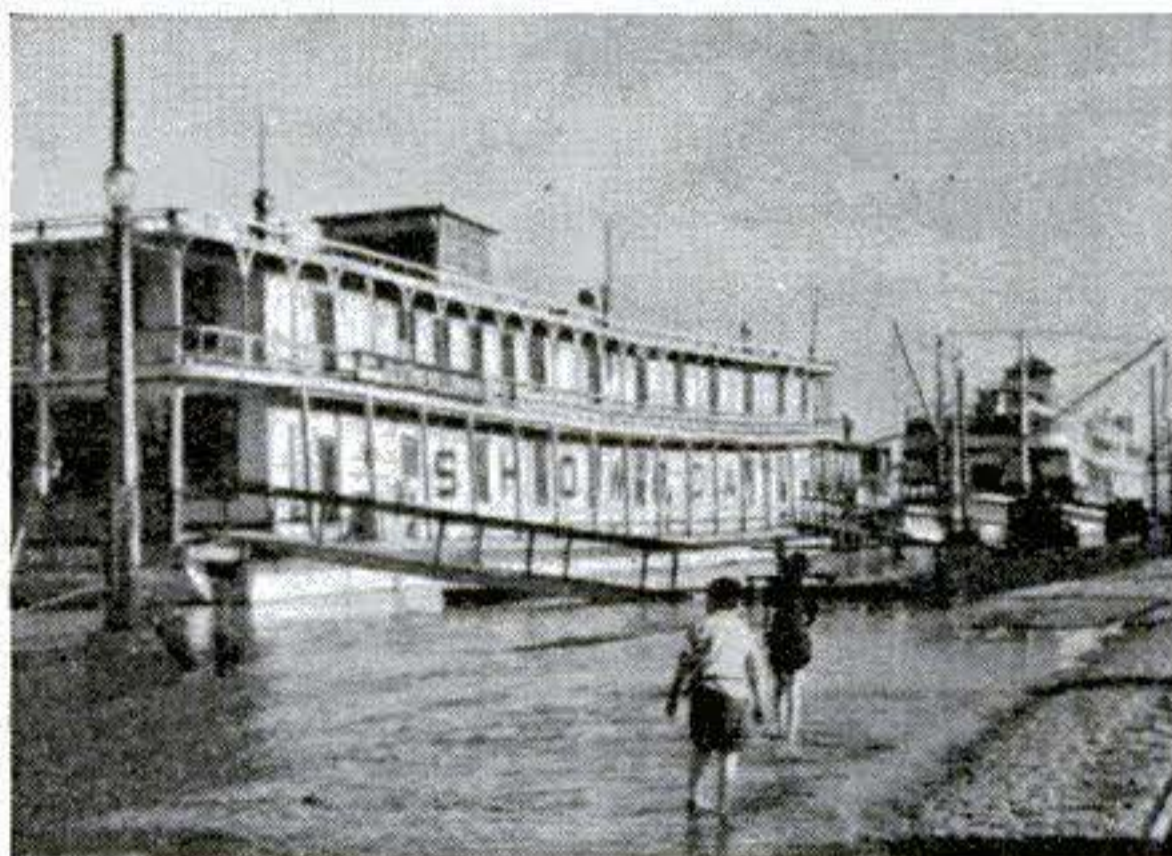
### **Towboat Carries Fuel for 3,000 Miles**

A retractable pilothouse which can be lowered on a hydraulic shaft enables the *Bruce Arthur* to pass under Chicago's low bridges. It can handle eight grain barges at a time, is 86 feet long, has a 22-foot beam, draws seven feet, and is of all-steel construction. Its fuel tanks will hold enough for 3,000 miles of nonstop operation—a sharp contrast to the days of the old paddle-wheelers, which had to stop often for coal or wood.

A towboat like the *Bruce Arthur* is small compared to ocean-going vessels, but it can shove a load of 15,000 to 20,000 tons, while 10,000 tons is the average cargo of an ocean freighter.

Pilots are still the aristocrats of the river. They earn from \$600 to \$650 a month. In 1952 dollars, that's not as much as the \$500 a month their predecessors took home in pre-Civil War days. But there are compen-

[Continued on page 216]



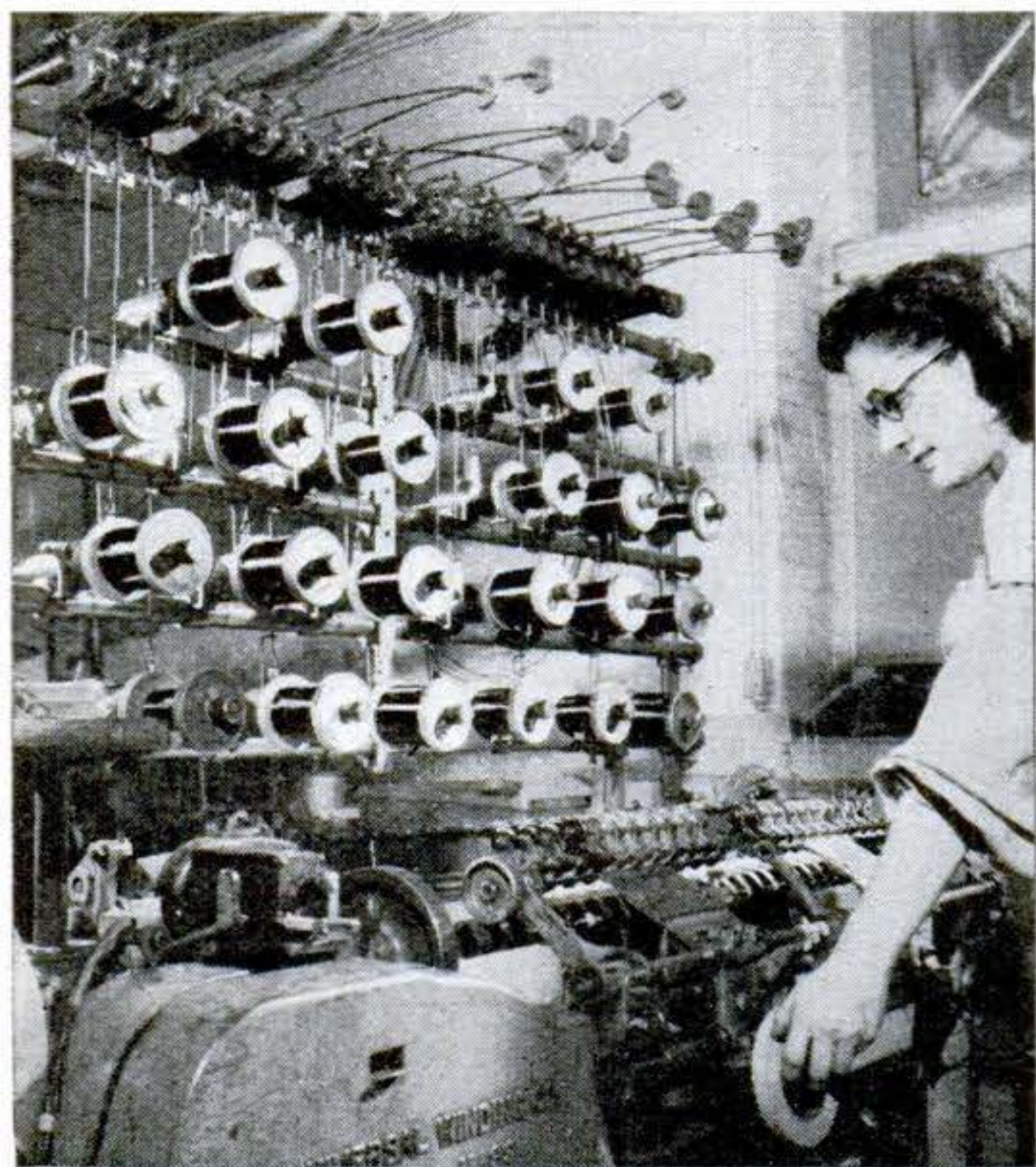
**GHOSTS OF BYGONE DAYS** still haunt the river front—showboat *Goldenrod* (foreground) and decommissioned *Golden Eagle* tied up at St. Louis.



### Car with Many "Eyes" Tests Headlight Beams

THIS multi-eyed vehicle is used by GE automotive-light experts to test Sealed-Beam headlights under actual driving con-

ditions. Their goal is a light that will show up an object clearly 165 feet ahead—the distance it takes to stop a car at 40 m.p.h.



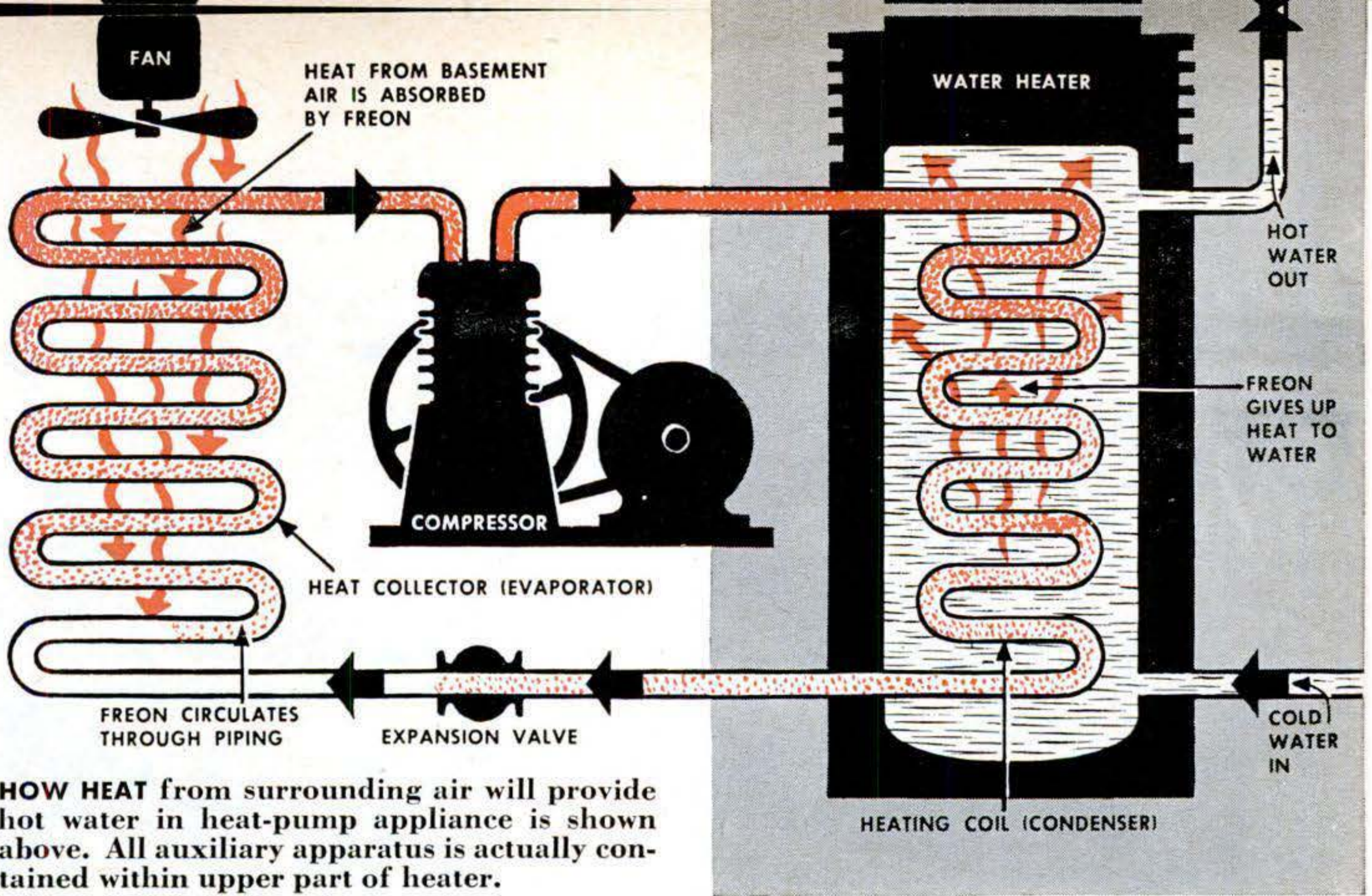
### Machine Winds Meter Coils

FROM this big bank of spools, the machine above winds 66 coils for electric meters every hour at the Newark, N. J., Westinghouse plant. Each coil takes 4,600 turns of copper wire eight-thousandths of an inch in diameter.



### Workers "Mine" Mushrooms

WEARING miners' caps, these girls harvest a crop of mushrooms in an abandoned limestone mine near Pittsburgh. Lamps on the caps of 200 workers provide the only illumination in the mine. The batteries are recharged after each shift.



**HOW HEAT** from surrounding air will provide hot water in heat-pump appliance is shown above. All auxiliary apparatus is actually contained within upper part of heater.

## Heat from Air Warms Water

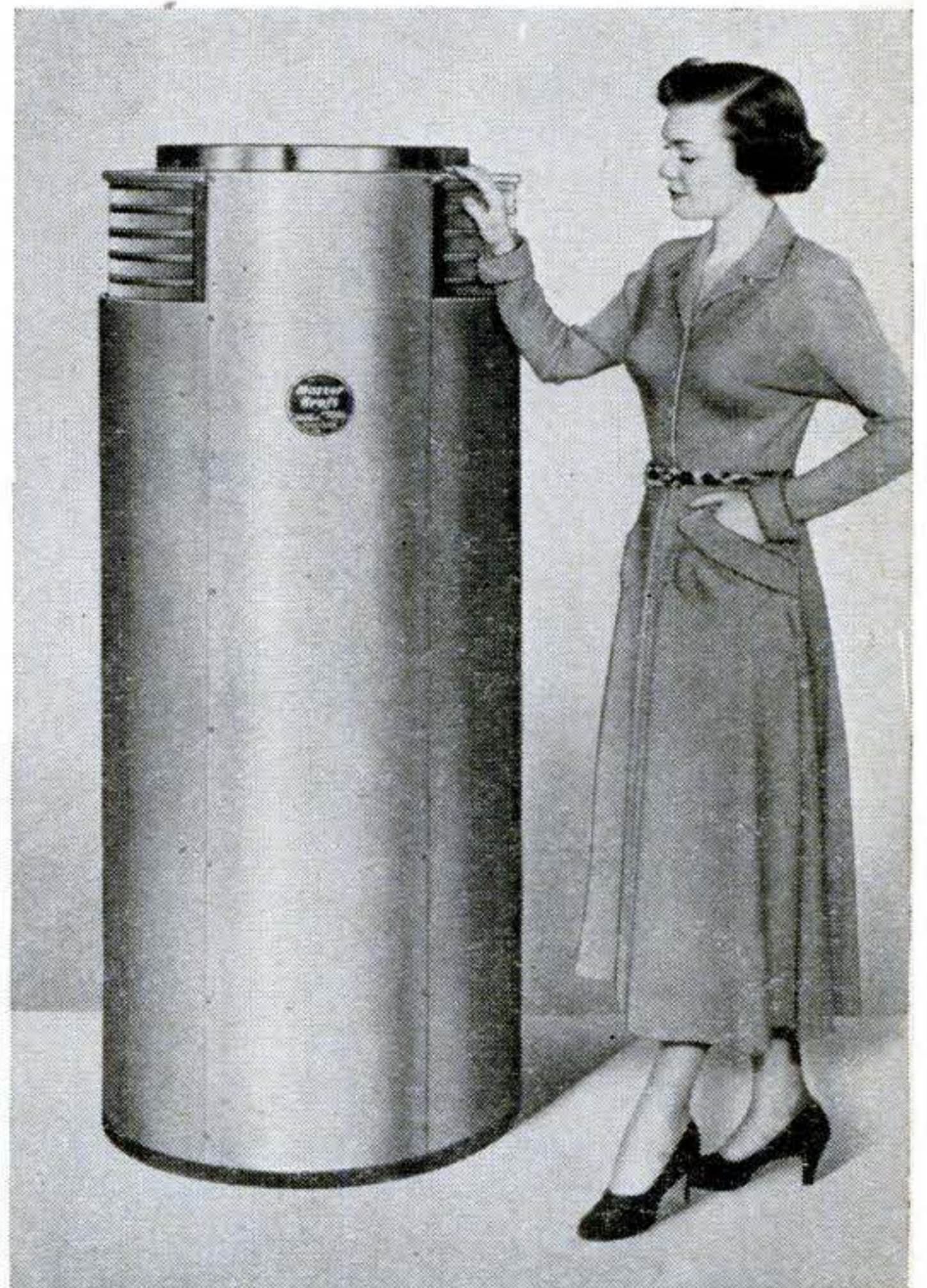
**"Reverse refrigeration" will be used to cut home electric bills.**

COMING soon is a radical new home appliance—an automatic electric water heater applying the ultra-modern "heat-pump" principle. It will supply your hot water, trials promise, at a fraction of the cost of using a high-wattage resistance-type heater. Several of the new type already built for testing give a preview of its design.

Its working parts resemble those of an electric refrigerator. It uses a refrigerant, Freon, as a heat-transfer medium. And it works like a refrigerator in reverse.

Source of heat is the surrounding air, whose temperature the heater lowers a little. Through an evaporator coil, a fan blows basement air, and Freon extracts heat from it in turning from liquid to vapor. The Freon vapor, warmed further by being pumped in a compressor, then enters a condenser and gives up its heat to water in a 53-gallon storage tank. It returns to liquid form and the cycle is then repeated.

Not yet on sale, the appliance is being readied for its debut by Harvey-Whipple, Inc., of Springfield, Mass. Its name will be the Master Kraft heat-pump water heater.

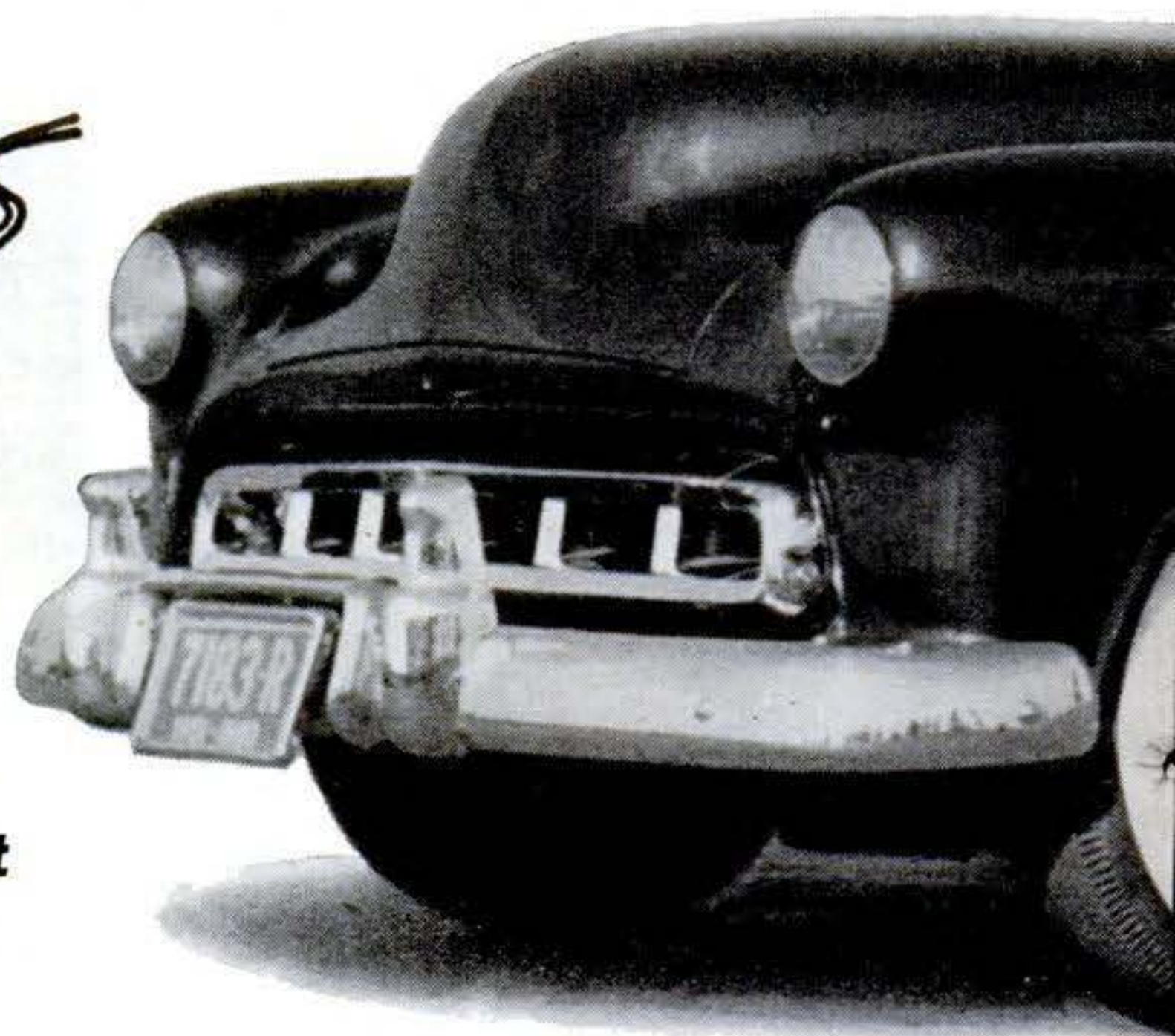


**DESIGN** of new type of water heater is exhibited by test model. Air, the source of heat, enters upper part and goes out at top. Fan and  $\frac{1}{3}$ -hp. compressor are all that consume current.

# Customized Chevy Costs a Cool...

**\$5,400**

**When the rebuilders got through with this brand-new Bel Air, the extras cost more than the car—but what a honey.**

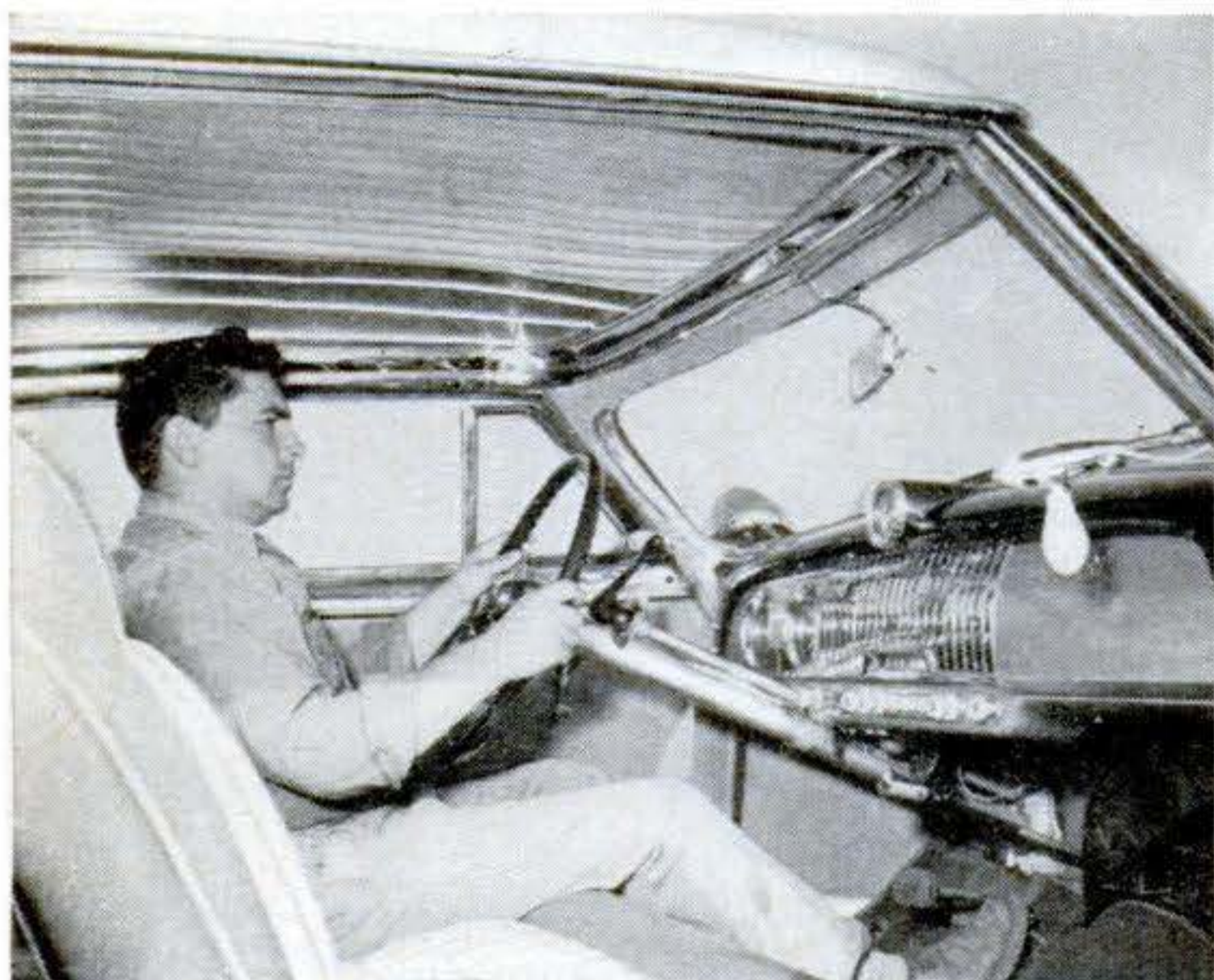


**W**HY be satisfied with a production-model car when for just a few thousand bucks extra you can indulge all your pet ideas in automotive design?

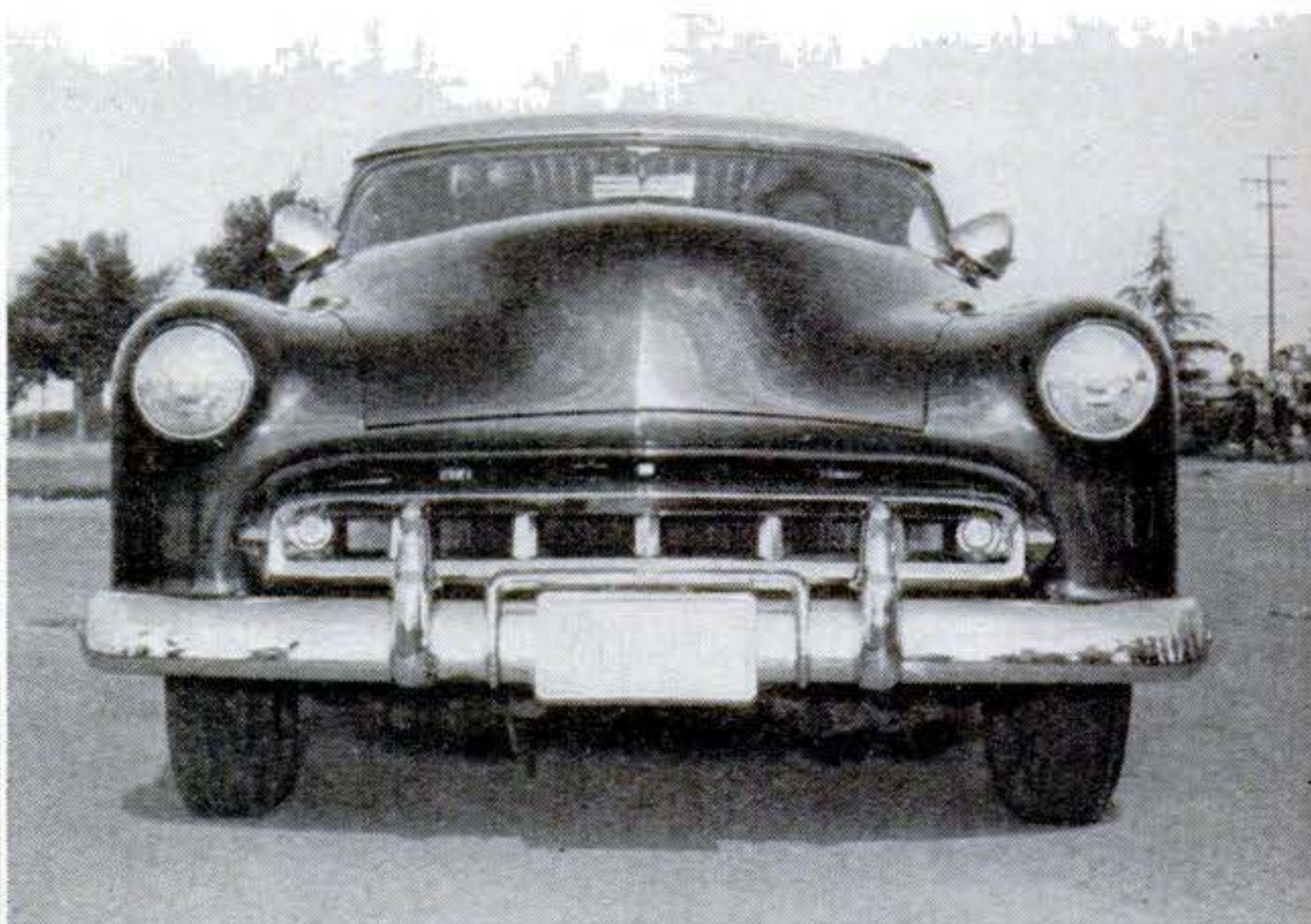
At any rate, that's how the owner of this de luxe dreamboat felt. An Ohioan who'd rather we didn't give his name, he got exactly the car he wanted—but the price tag was around \$5,400 before he was through.

Starting with a factory-fresh '51 Bel Air, here are some of the changes made at the Barris brothers' Lynwood, Calif., shop, along with approximate cost:

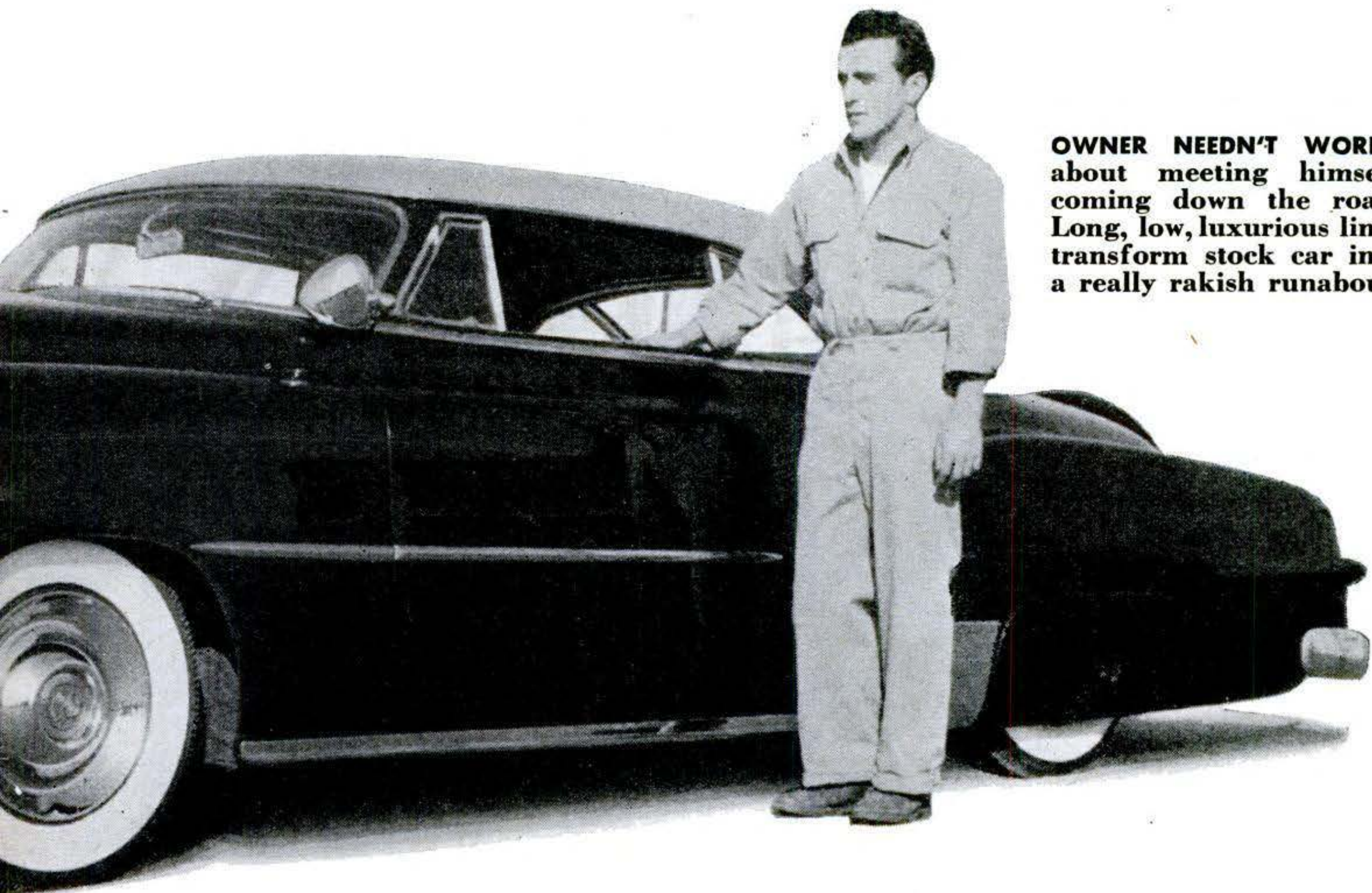
Three inches chopped off the top, two inches added to the hood and 10 to the rear fenders (\$600). Curved one-piece '51 Olds windshield installed (\$75). Front end done over, including new grille and head-



**STEERING WHEEL** was lowered two inches for driver's comfort. Seat upholstery and roof padding are foam rubber covered with gray and white antique Fibrolite.



**SCOOP-SHAPED GRILLE** was assembled with parts from a Canadian-built Ford Meteor. Total effect of car is that of a complete custom job from top to tread.



**OWNER NEEDN'T WORRY** about meeting himself coming down the road. Long, low, luxurious lines transform stock car into a really rakish runabout.

lights sealed into fenders (\$300). Rear end restyled, windows enlarged, horizontal tail lights put in, hinged mount for spare tire added (\$500). Frame lowered, rear suspension changed, adjustable spring installed to raise or lower body 2½ inches (\$200).

Upholstery for seats and top got the full treatment—two-tone luxury fabric over Air-foam (\$400). A new paint job kissed two

more C-notes good-by. And a few final features like push-button control for the radio antenna, special hub caps, extra chrome, spotlights and other gadgets upped the ante another \$625. Grand total: \$2,900.

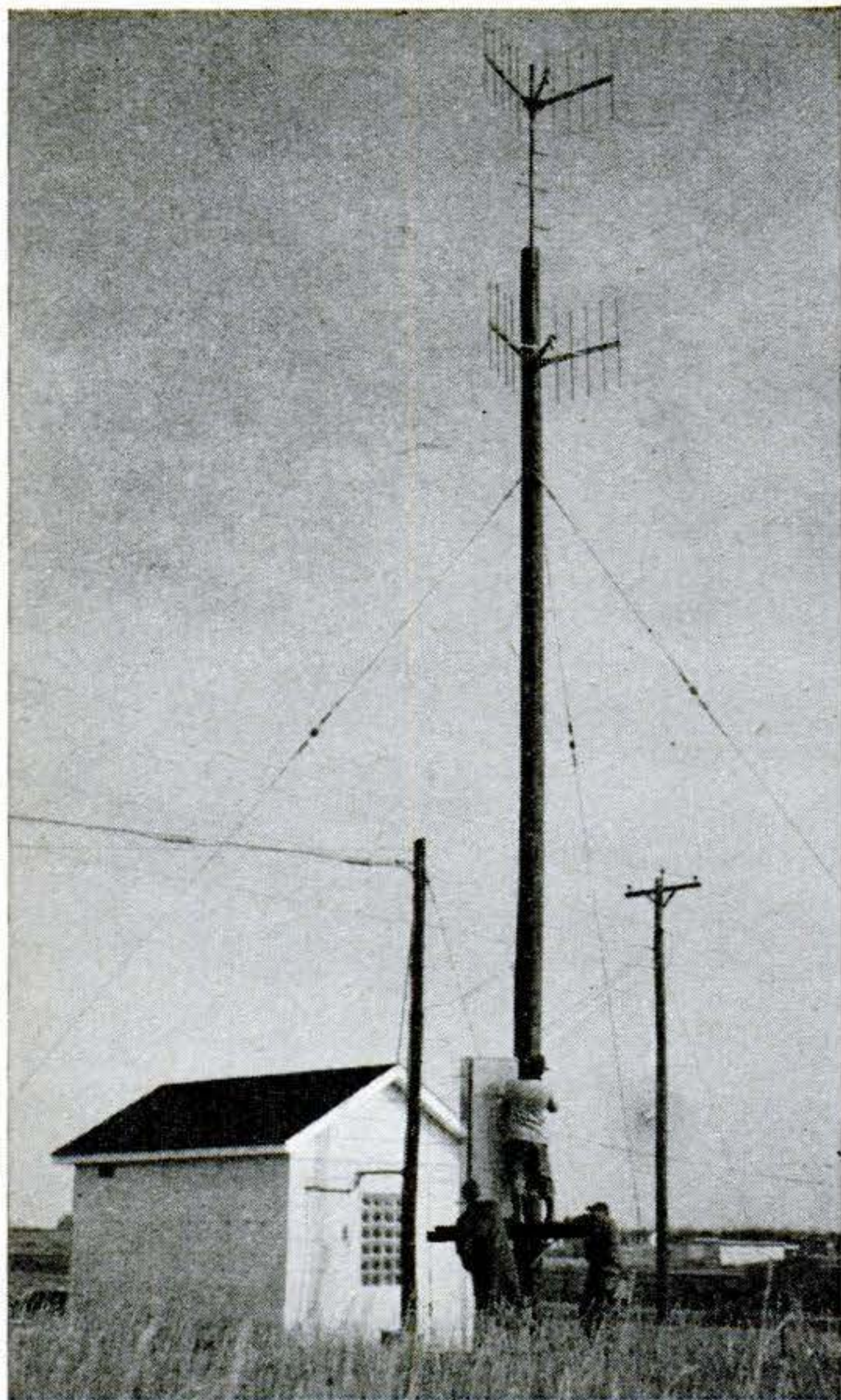
Owner X now drives a beautiful buggy—that nobody can deny. But a second glance at all those dollar signs makes the old family bus look pretty good at that!



**SPARE-TIRE MOUNTING** lets tire tilt back for easy access to luggage compartment. Oval tail lights accentuate car's extra-wide look. Cadillac hub caps add final fillip.



**RADIO ANTENNA** is raised and lowered by vacuum. Flattened rear windows, two inches wider than in standard model, look more stylish, increase visibility, too.



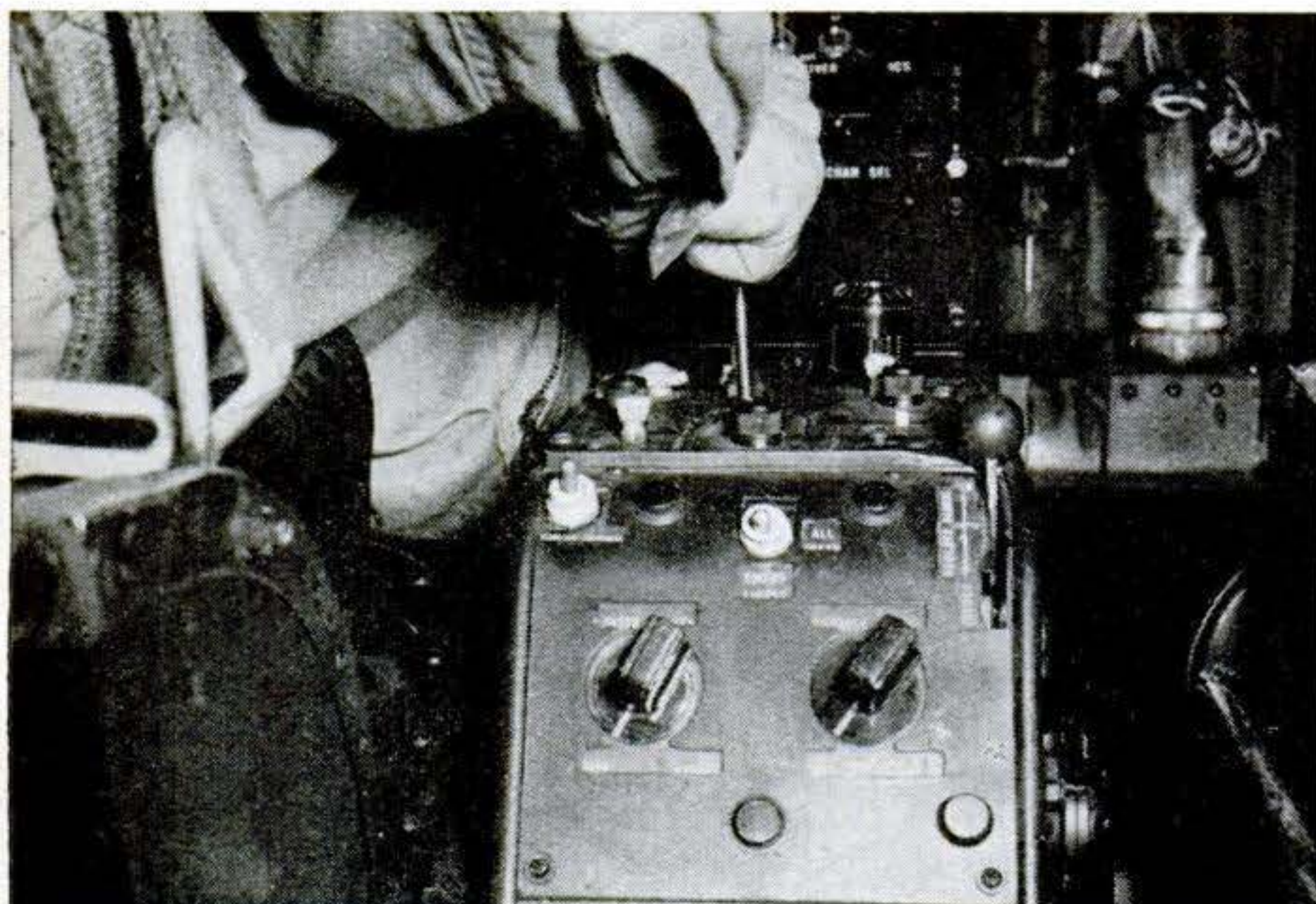
### Farmers Phone via Radio

A GROUP of Virginia farmers on a party line now are linked to a telephone exchange via the air waves. Their party line, ending at a nearby radio station, is beamed to a similar station at a dial exchange 10 miles away (above). An experimental system designed by the Rural Electrification Administration, it eliminates miles of poles.



### Tripod Gives GI a Break

RODMEN working in artillery survey parties under enemy fire no longer have to stand in exposed positions while observations are being made. Using a new metal tripod, the men place and plumb ranging poles fast and then duck for cover. Designed by the Army, the tripod holds a pole rigid even in a 40-mile-an-hour wind.

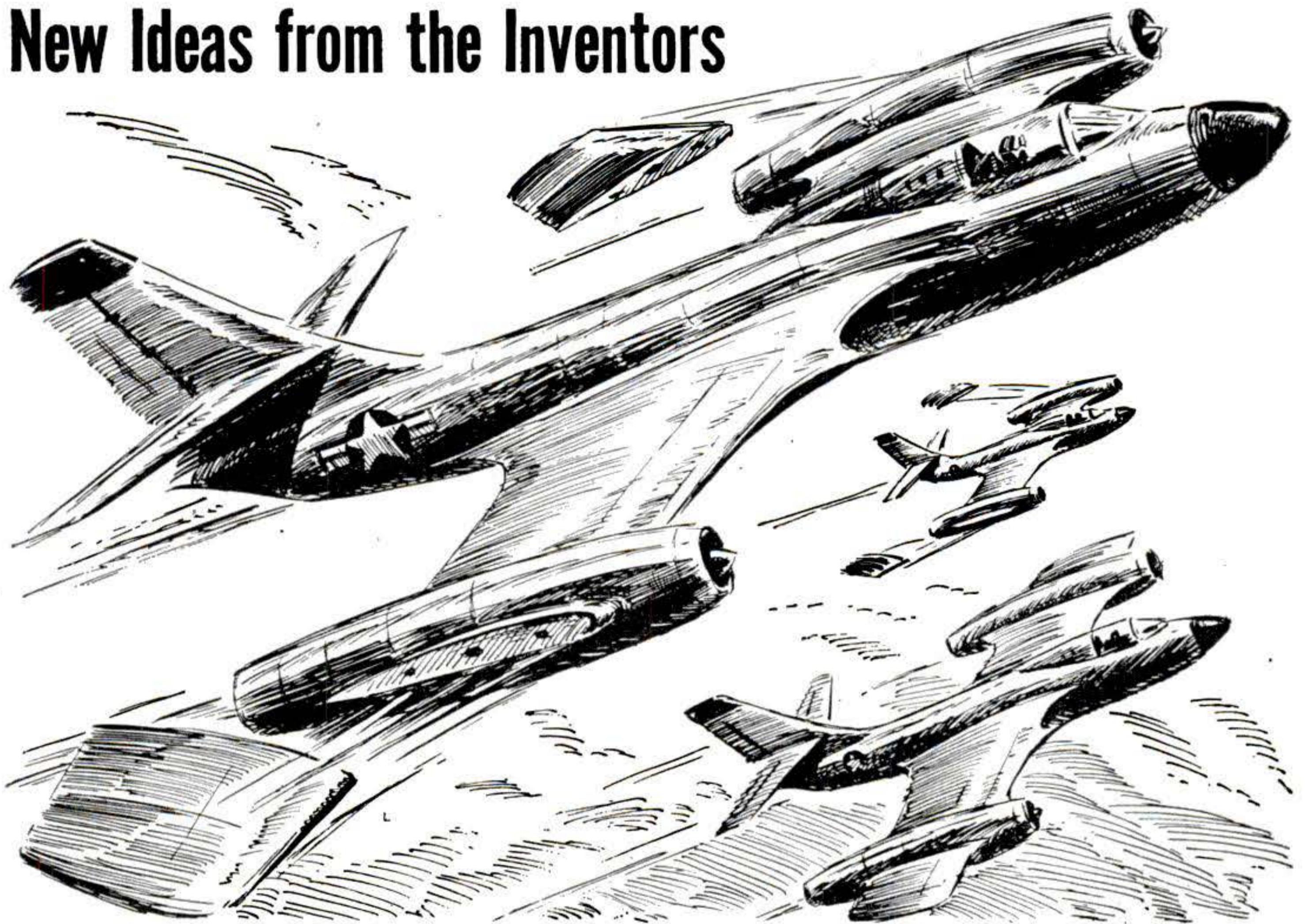


### Autopilot Flies Fast Navy Jets

FLYING, fighting, navigating—the Navy jet fighter pilot does all three at the same time. But a new automatic pilot (left) will handle most of the stick-and-rudder work. Push buttons and a miniature stick that moves under fingertip pressure control the plane. The General Electric device will be used to fly the airplane while the pilot sticks to his guns during attacks on enemy aircraft.

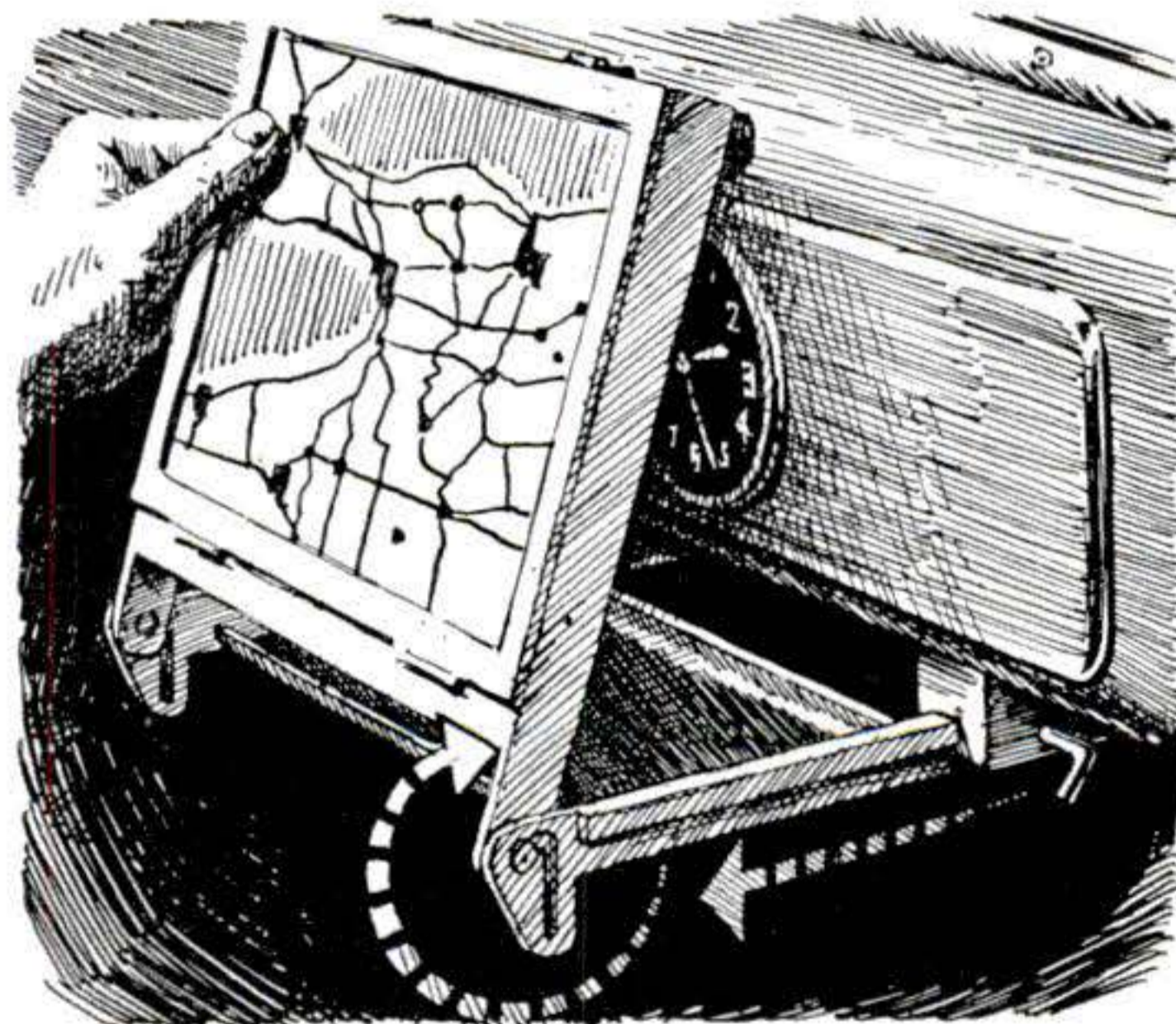


# New Ideas from the Inventors

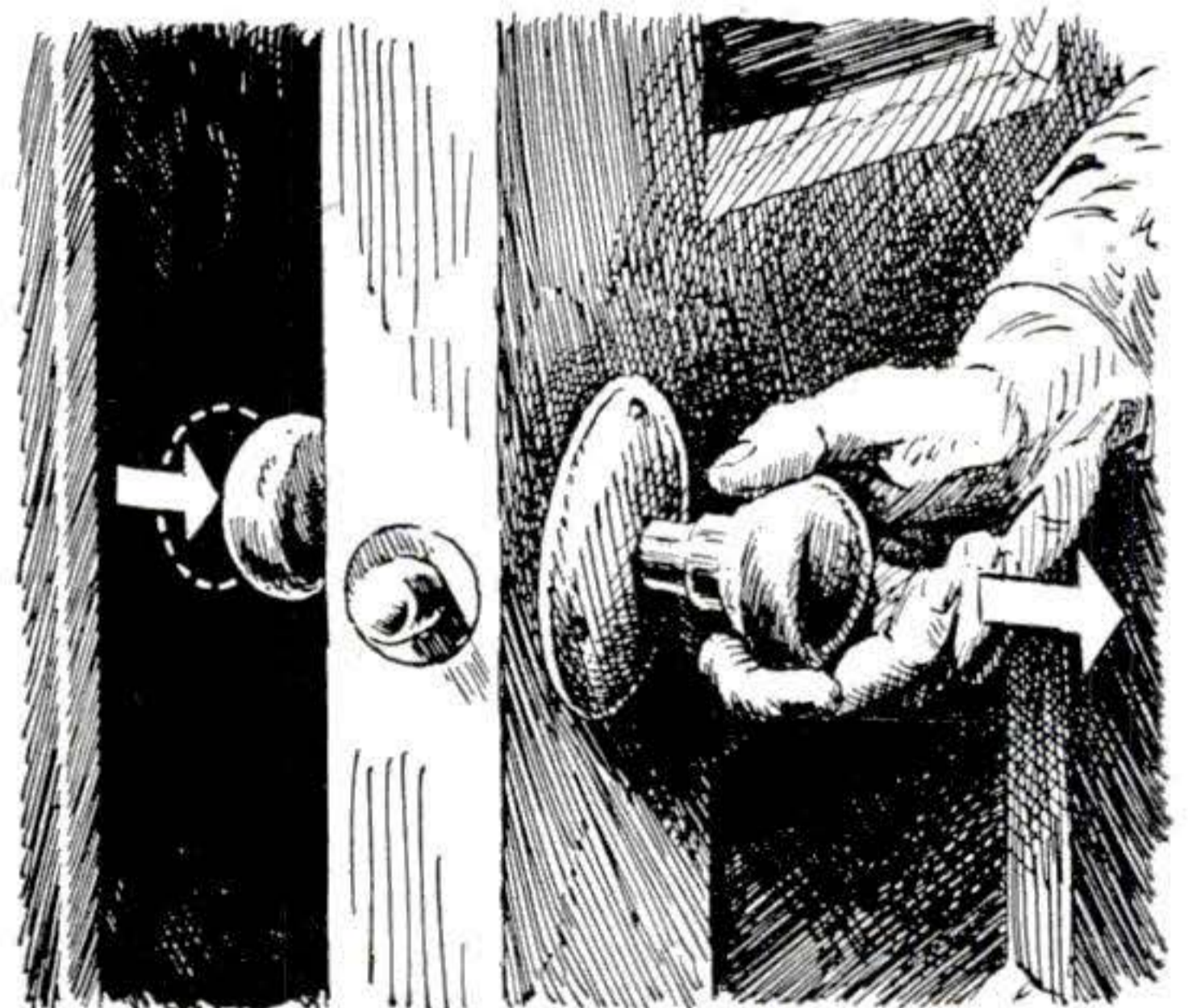


**1 Plane to Drop Wing Tips.** Pilots could gain extra speed during actual combat by shortening the wings of this proposed jet plane. The tips of the wings would be droppable fuel tanks that could be released

in an emergency or when they were empty. With the tips in place, the big wings would give the plane extra lift for take-off and cruising. When the going got rough the pilot could shed wing area as well as weight.



**2 Car Tray to Display Road Maps.** You could see where you were going and where you wanted to go if your car had this folding map holder. It would slide out from under the dash and prop up a section of road map so that it could be seen easily from the driver's seat. Pulled out and left flat, the map case would double as a food tray.



**3 Push Knob to Open Door.** You would be glad to have this latch on your door if you came home with loaded arms. From outside you would just push the knob to retract the bolt. From inside you would pull it. The bar that connects the knobs operates the bolt through a cam. A pin fitted to the inside knob locks the cam.

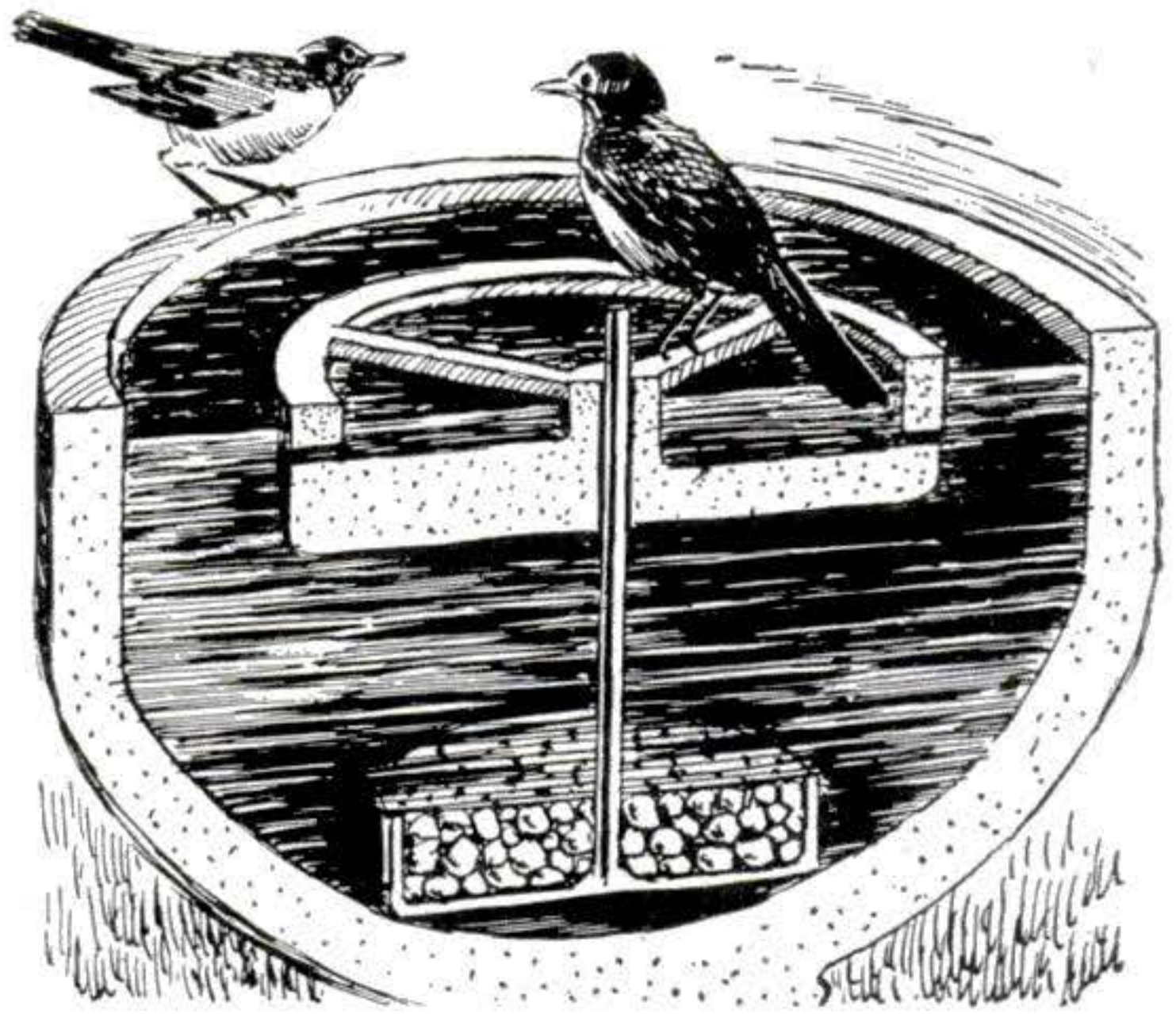
**Please turn the page for more new ideas.**

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**5 Jack to Guide Felled Trees.** Woodcutters who used this jack wouldn't have to worry about where the trees would fall. The spring-loaded jack would push against a tree to help topple it and direct its fall. The upward pressure would also hold the saw kerf open and make cutting easier.

*Patents on these inventions have been granted to: 1. D. Beck, Seville, Ohio, and E. Eddy, Massillon, Ohio; 2. W. Haynes, Longview, Wash.; 3. C. Anderson, Barberton, Ohio; 4. J. Webster, Lafayette, Ind.; 5. M. Jacobs, Minneapolis; 6. T. Stiffel, Chicago.*



**4 Birdbath to Fill Itself.** Anchored in a tank or pond, this birdbath would rise and fall with the surrounding water to maintain a constant level in the bath tray. The floating tray, divided into sections of different depth, is designed to slide up and down on a rod secured to a weighted base. Openings near the top of the tray partitions let water in.



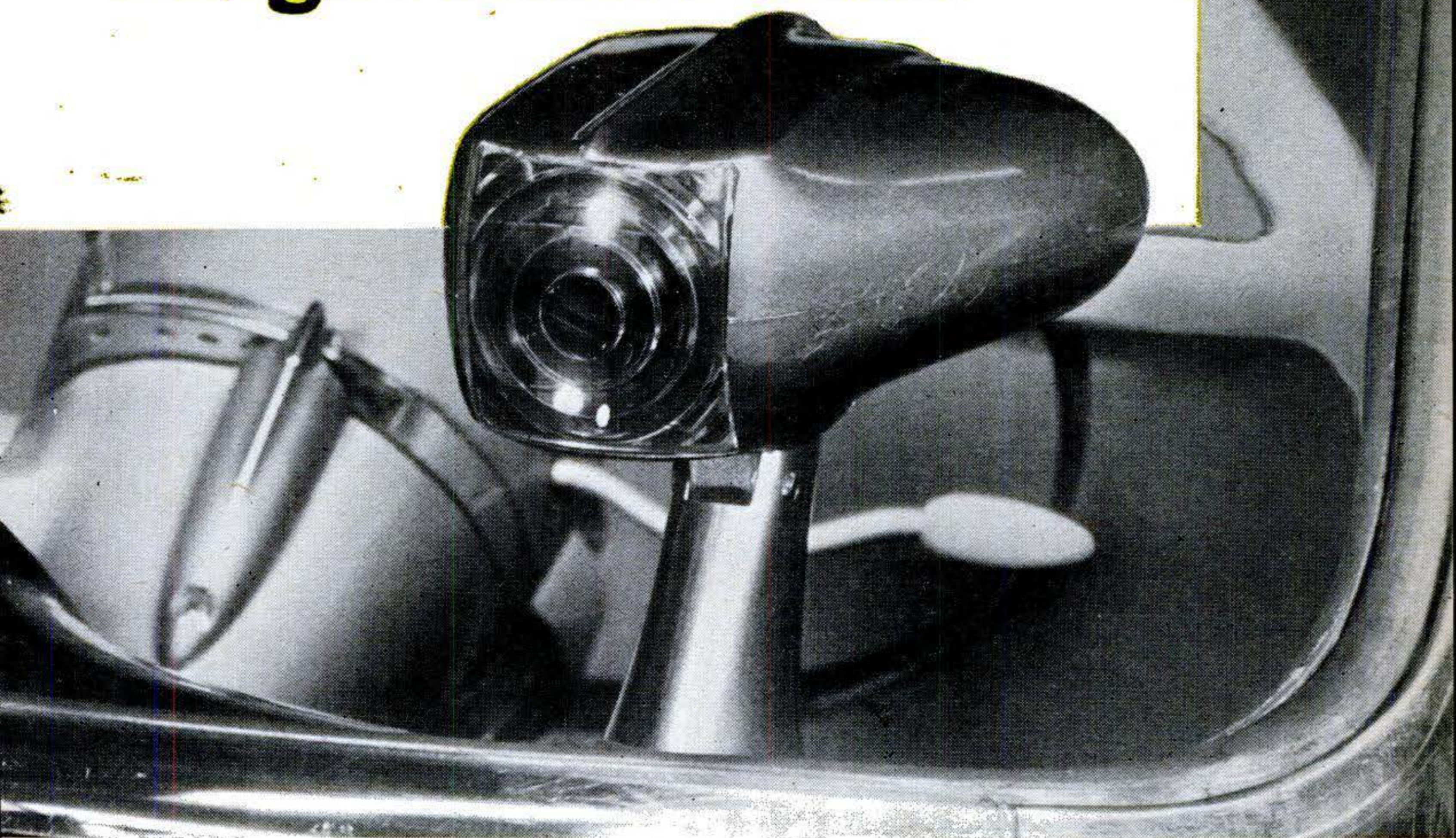
**6 Lamp to Hide TV Antenna.** Indoor antennas don't have to be in sight when they are not in use. The inventor of this combination antenna and lamp suggests concealing telescoping rods inside the shade. When the set was tuned in, they could be extended, tilted and rotated.



# Oldsmobile's

# "Magic Lights"

# Delight Wilbur Shaw



**Automatic headlight dimming is not all that's new in the '52 Olds—there's power steering and a multiple-barrel carburetor.**

**By Wilbur Shaw**

I CLIMBED aboard a '52 Oldsmobile and there behind the windshield, vaguely resembling the head of a cobra, sat the Gimmick.

"Forget the dimmer switch on your headlights," remarked the factory representative who turned the car over to me in Tampa, Fla. "This thing automatically dims your lights for you when you meet an oncoming

car. Just forget about the whole thing."

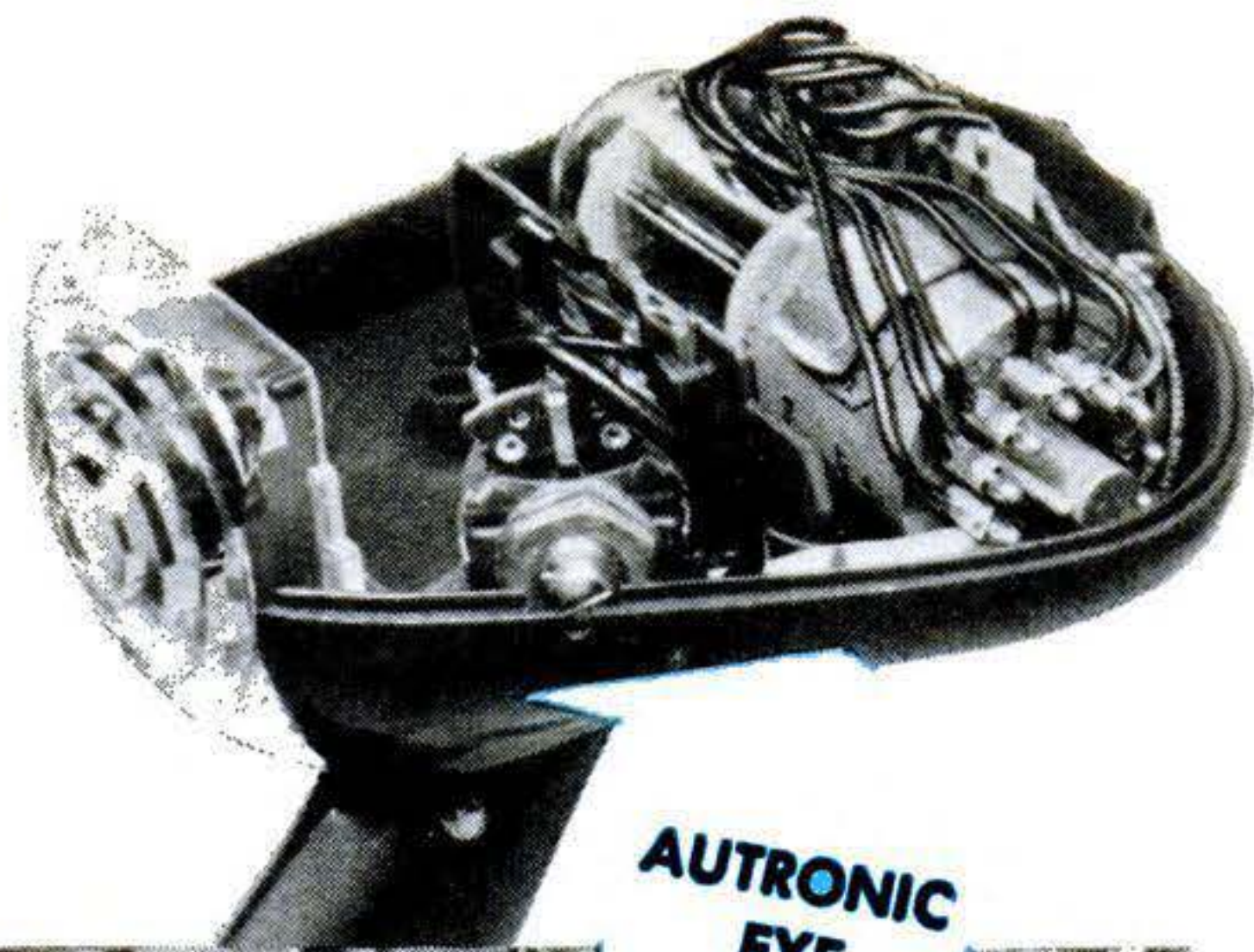
If it worked, the Gimmick would be one of the finest additions to motoring comfort in years. How often have you forgotten to dim your lights and hated yourself for your thoughtlessness? How often have you failed to switch on your brights again after passing another car?

The Gimmick, a photocell-operated switch, wasn't the only thing new about this Series 98 Olds, by any means. It had a lot more

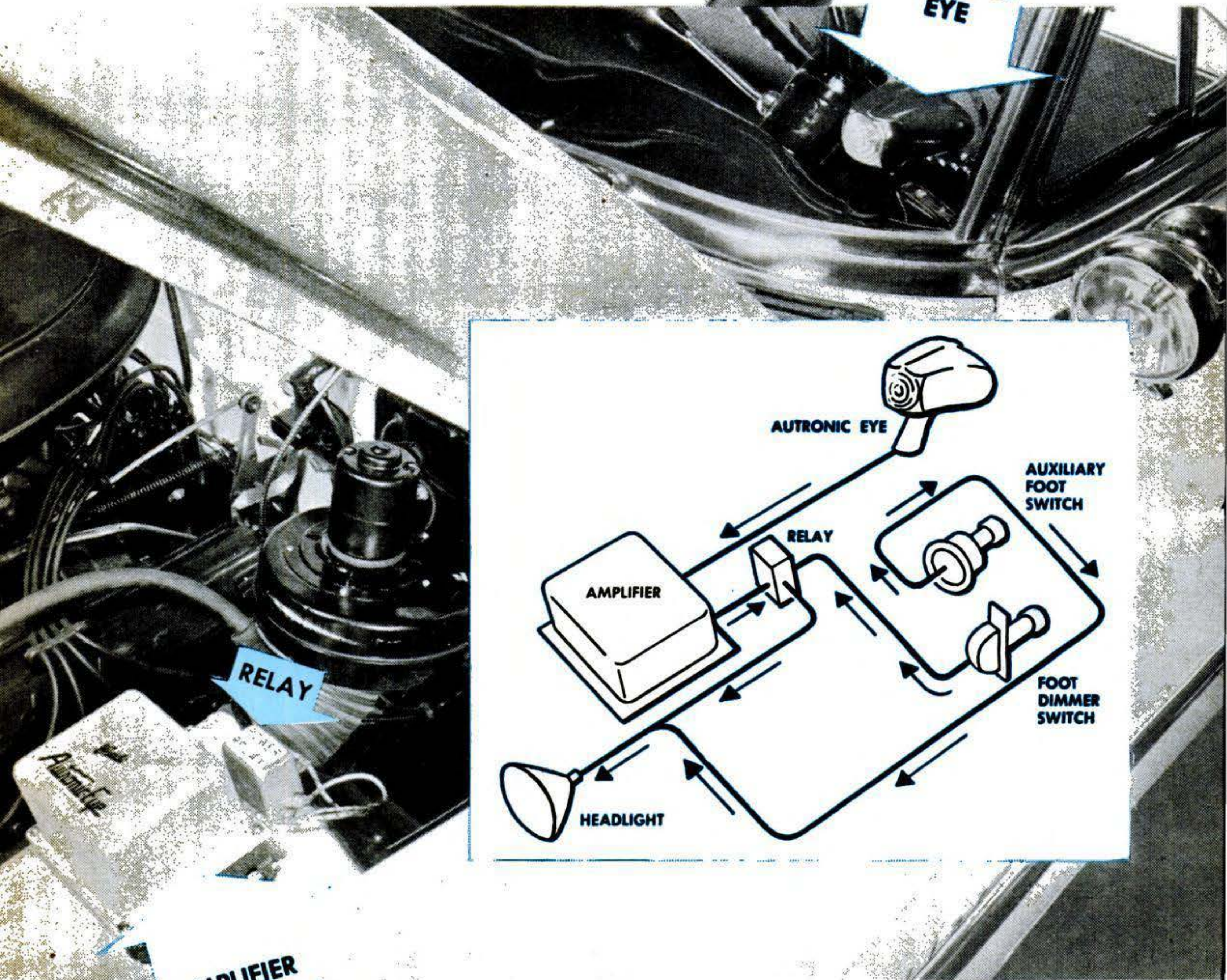
power than the one I drove for my Report from the Driver's Seat last year\* (PSM, June '51, p. 66). The new Olds had power steering, an improved automatic transmission and a new kind of carburetor.

Added were such little niceties as a clock mounted on the steering wheel instead of the instrument panel (and it really keeps time!), a compass and more luggage room.

It was night when I started for the Gandy Bridge spanning the bay between Tampa

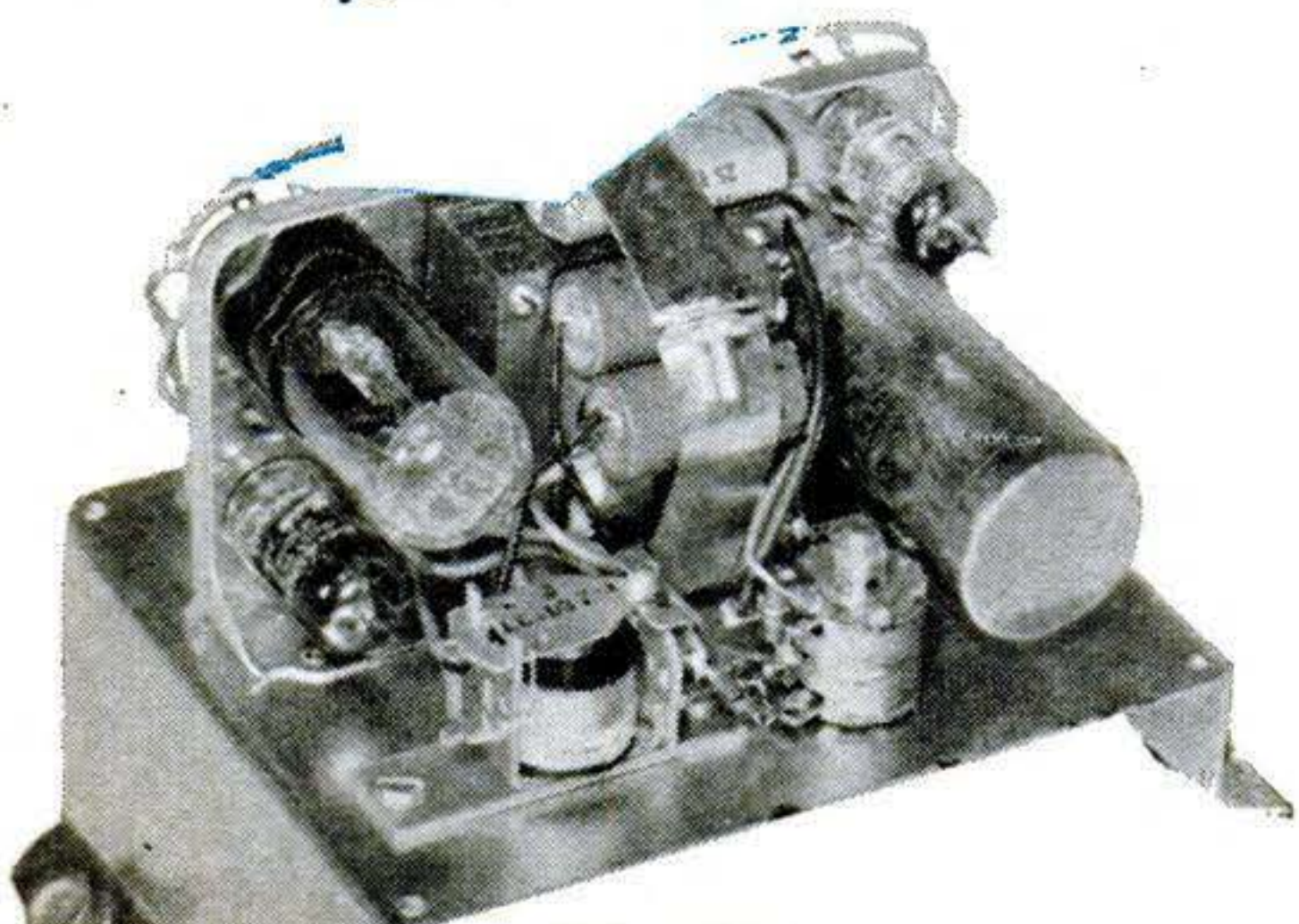
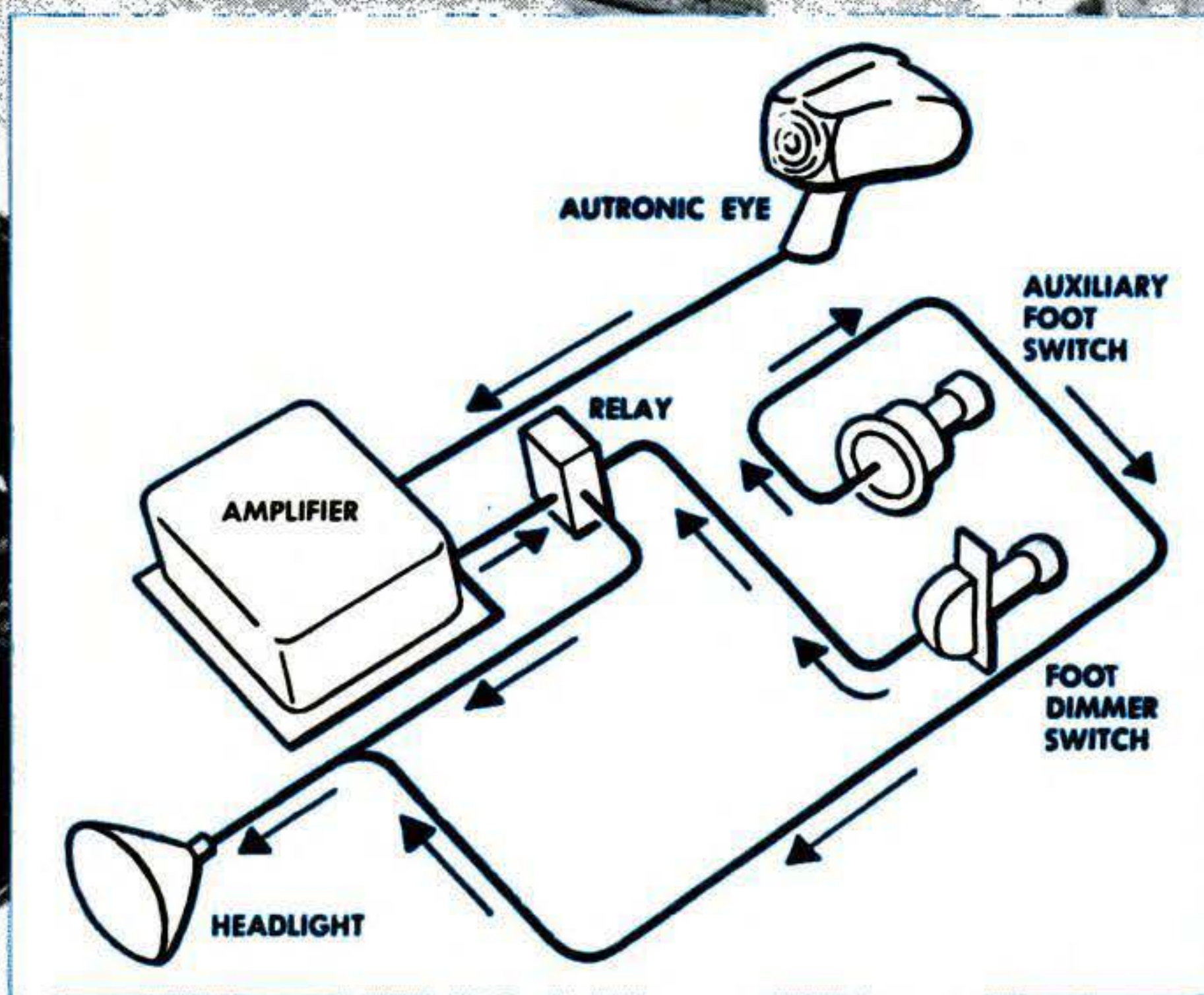


**AUTRONIC EYE**



**RELAY**

**AMPLIFIER**



**THE AUTOMATIC DIMMER** has three main elements—a photoelectric cell with a condensing lens, a set of tubes to amplify the signal transmitted by the cell when light strikes it, and a relay or switch reacting to the signal to dim the lights. The arrows in the schematic drawing above show the sequence in which the dimming signal is transmitted to the headlights. The regular floor switch turns the eye on and off. The auxiliary switch overrides the eye—made by GM's Guide Lamp Division—to turn on the brights at the driver's option.

and St. Petersburg. As I drove, I made a few comments on my recording machine:

*This thing is an idea that automobile people—and drivers—have been talking about, and trying to work out for years.*

I had a similar device in experimental dress on a car more than a year ago. Tobey Harper of Tulsa, Okla., demonstrated it to me and I tried it out. I liked it. The idea was not new. As much as 20 years ago Ford was fiddling with it. It has taken all this time to get an automatic dimmer into production.

Nor is this the only kind of an attack on the problem of headlight glare that has been made. Many of us will remember the experiments with polarized headlighting.

### **The Gimmick at Work**

*It works, all right. The street lights keep the beam low. That takes care of city driving. It means one less control on your car to worry about. And . . . I've often remarked . . . all such items contribute to safety.*

Suddenly the lights flipped up. It was an eerie feeling to have things going on inside your car that you hadn't ordered by pushing or pulling or pressing something. The brights had switched on because I had left the street-lighted area and reached the open road. A few seconds later the lights dimmed again—the Gimmick had spotted an oncoming car.

*Now we'll see what the bridge traffic does to the lights . . . yup . . . they stay low . . . due to a steady procession of oncoming cars . . . now, off the bridge and . . . up go the lights . . . there's a break in the traffic of several hundred feet . . . and there's a car coming . . . they're dimmed again.*

I experimented. Turning onto a darkened street, I decided to see how directional the Gimmick was. My lights were high. Half a block from a corner street light of normal intensity, my lights were still high. A quarter of a block from the street light I steered the car directly toward it. My headlights dimmed.

### **Even Works Through Dirt**

All this was strictly according to the explanatory literature put out by the Oldsmobile people. The Gimmick worked.

Called by Olds the Autronic-Eye, the automatic light dimmer functions even if the windshield gets dirty. This is one of those automobile accessories that start out as a luxury and become a necessity. Electric

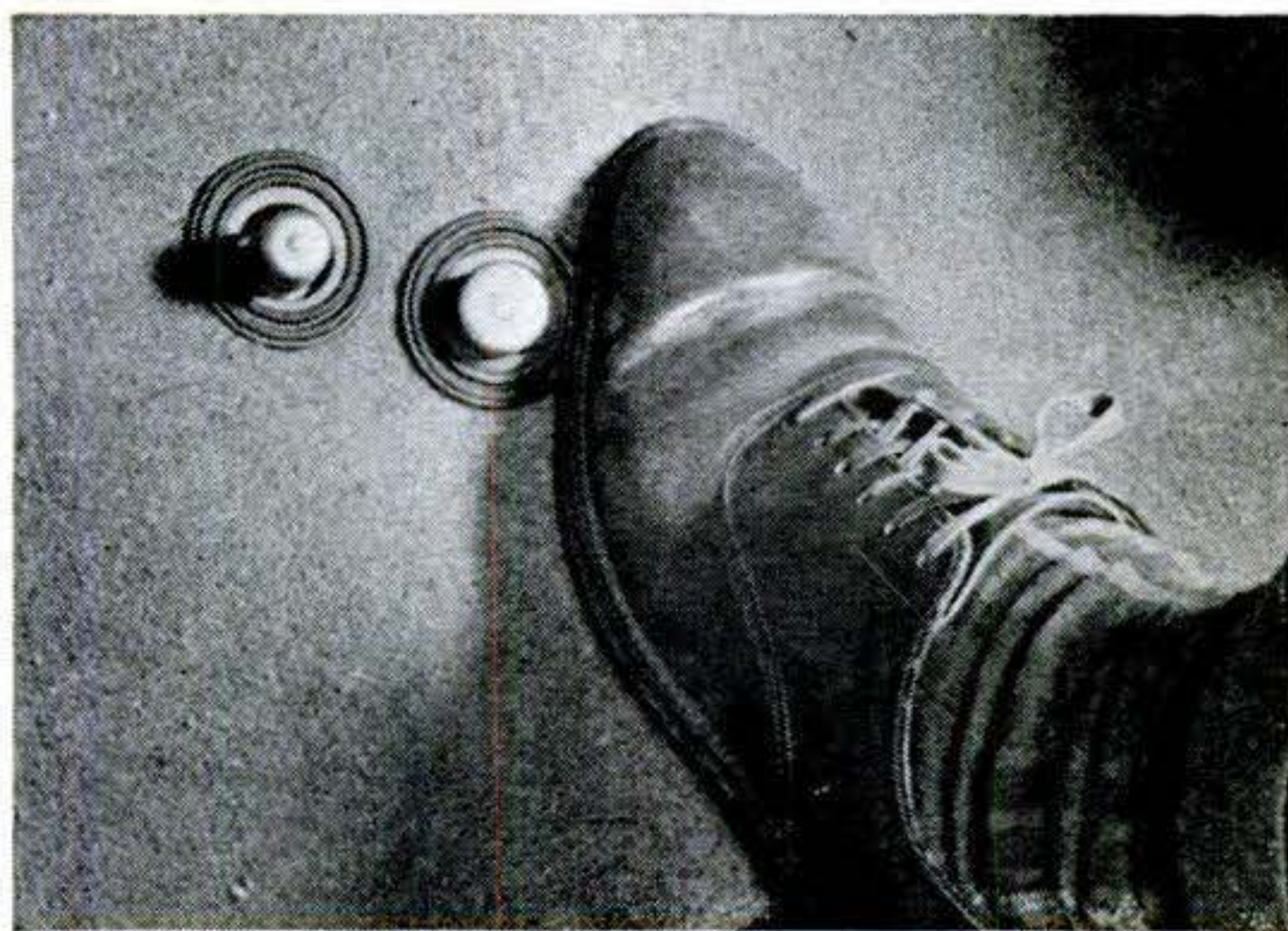
turn signals once were a luxury. Now some states require them. I've no doubt that the dimmer will become standard equipment on cars as time goes on.

The next day I took the 98 out to see what else General Manager Jack Wolfram of Olds had done to enhance the performance of his car.

This was my first experience with the General Motors version of power steering, and I had this to say about it.

*The GM system differs from Chrysler's, introduced last year [PSM, Apr. '51, p. 126] . . . the GM unit gives you slower steering—you turn the wheel more to get around a corner . . . moreover, I'm exerting more effort on the wheel than the Chrysler system requires . . .*

*At high speed . . . there's 70 on the speedometer . . . it still takes the normal amount of turning to change direction . . . that's*

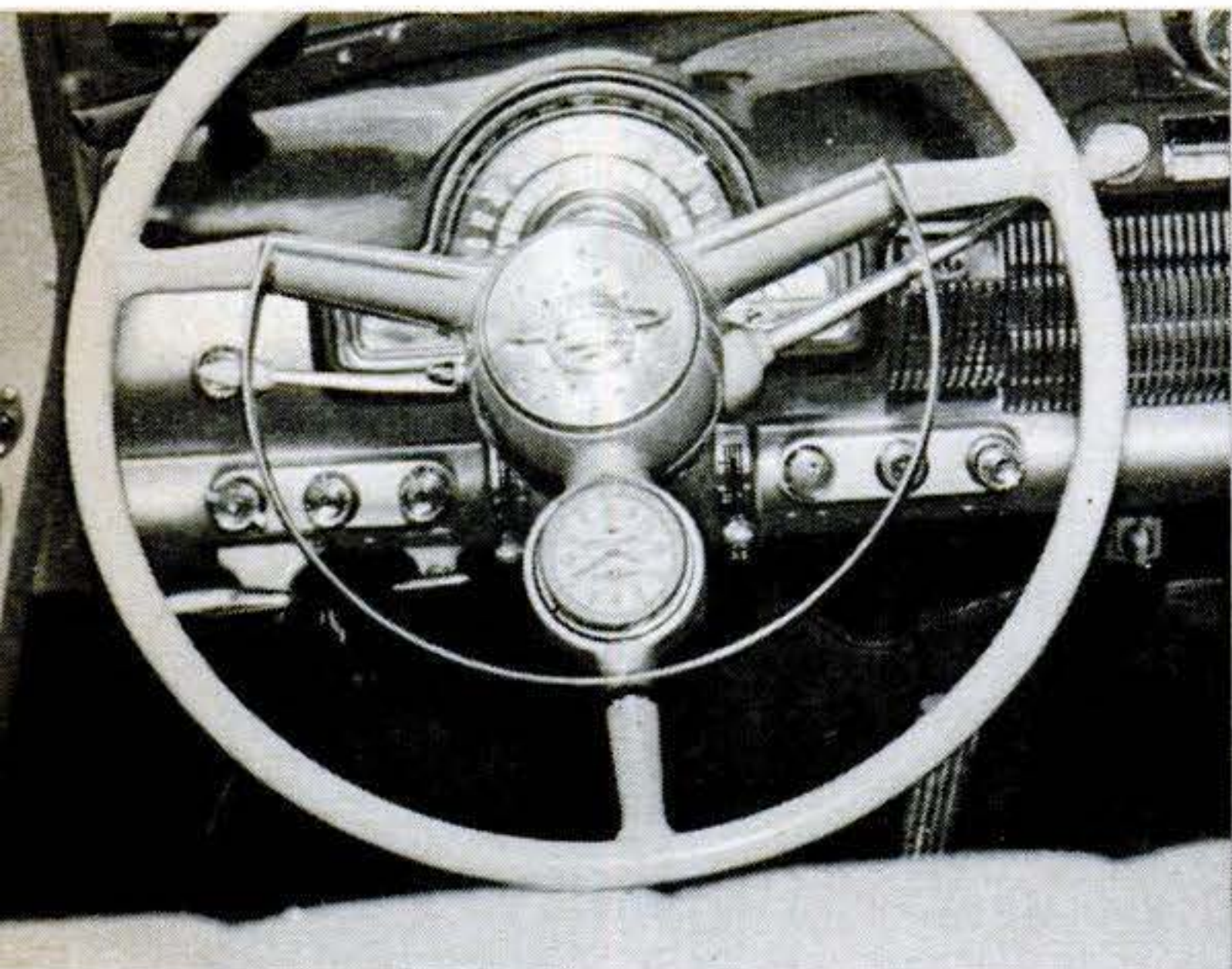


**THE EYE REQUIRES TWO BUTTONS.** Pushing on the right one turns it on or off. The left one overrides the eye and switches on the high beam to signal an oncoming car.

*what General Motors intended, and that's where its approach to power steering differs.*

Let's get down to the fundamentals of this. With today's big tires, you need slow steering—several turns of the wheel from extreme right to extreme left—to bring the effort required within range of your muscles. Slow steering reduces the effort. Because tires are big in cross section, you actually scrub rubber when you turn the front wheels.

As tires have become bigger, accepted highway cruising speeds higher and steering slower, the problem of maneuvering a car both in parking and on the open road has been aggravated. For my money, power-assisted fast steering, like Chrysler's, is the answer. It enables you to maneuver quickly



**SELF-WINDING CLOCK** on steering-wheel is guaranteed to keep time—and it's *about* time that cars got good clocks. You can set a red arrow on the rim to record departure time.



**THE TRIM** on the Oldsmobile has been fancied-up. There's a protective metal cup inside the door pull, and sure as shooting, some customers are going to use it for an ash tray.

with minimum effort on the steering wheel.

GM thinks differently. The Olds I drove retained slow steering. That was to save the driver from having to change his steering habits. The Olds also required from three to 10 pounds of effort on the wheel (against 10 to 50 pounds without the hydraulic booster)—considerably more than Chrysler demands. GM deliberately put that resistance in the wheel to give a driver more feel.

A lot of people won't agree with my choice between the two systems, which may never be reconciled. And it may well be that I like the Chrysler steering only because I'm accustomed to the fast steering of racing cars—absolutely necessary for really high speeds. In any event, power steering will delight you, be it GM's or Chrysler's.

With the new multiple-barrel carburetor (PSM, Mar. '52, p. 122) and added power, the new Olds has a lot more sass. At 65 miles an hour, I could accelerate, pull out and pass other traffic at will. Driving in the city with the third, or Super, setting on the dual-range selector quadrant, made the Hydra-Matic unit less responsive to car speed and more responsive to the accelerator.

Speedometer error proved to be three miles an hour high at an indicated 60 miles an hour. With two passengers aboard and the wind behind me, I accelerated to 60 indicated in 12.5 seconds. Top speed was 100 indicated, but the time it took to reach it—46.5 seconds—left something to be desired.

Braking was superior. I stopped dead

## FACTS ON '52 OLDSMOBILE

**Model:** Series 98 four-door sedan.

**Engine:** V-8 valve-in-head; 160 hp. at 3,600 r.p.m.; compression ratio, 7.5:1; piston displacement, 303.73 cu. in.; piston travel (in feet per car mile at 20 m.p.h.), 1,406; bore and stroke, 3 $\frac{3}{4}$ " by 3  $\frac{7}{16}$ "; crankshaft bearing surface, 73.9 sq. in.; torque, 283 lb.-ft. at 1,800 r.p.m.

**Weight:** gross, 3,760 lb. (shipping weight); per hp., 23.5 lb.

**Transmission:** three-speed synchromesh; Hydra-Matic optional; rear-axle ratio, 3.64:1 for synchromesh, 3.42:1 for Hydra-Matic.

**Steering ratio:** 21.3:1; radius of turning circle, 20.75 ft.

**Effective brake-lining area:** 191.7 sq. in.

**Springs:** front, coil; rear, semi-elliptic.

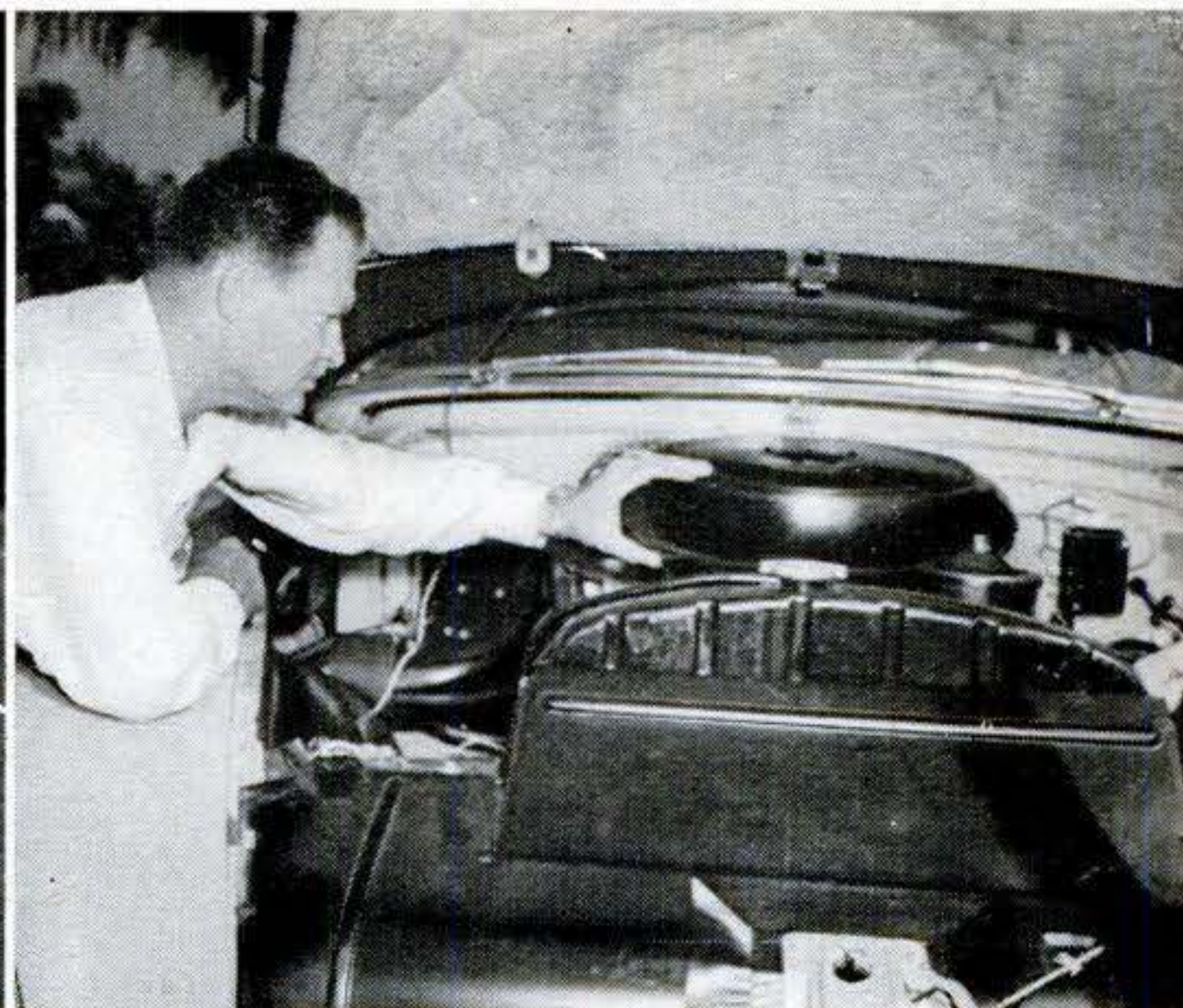
**Outside dimensions:** height (normal load), 63.66"; over-all length with bumpers and guards, 213.23"; width, 75.96"; wheelbase, 124"; overhang, front 34.17", rear 55.06"; tread, front 58", rear 59".

**Inside dimensions:** seat-cushion width, front 63.12", rear 63.4"; leg room, front 42.51", rear 42.88"; headroom, front 35.53", rear 35.02"; seat height, front 13.65", rear 12.38"; vertical distance, steering wheel to seat cushion (minimum), 5.36"; front-seat adjustment, horizontal 5", vertical .34".

**Tire size:** 7.60 by 15.



**THE TRUNK** is a full 11 inches deeper than it was last year, measuring 54 by 36. New high-positioned tail lights can be seen from the side—an added safety factor.



**OLDS HAS BOOSTED** engine power from 135 to 160 horsepower without increasing displacement. The flat air cleaner my hand is on was redesigned to accommodate new carburetor.

from 60 in 124 feet. The car did dive and swerve. The brakes needed adjustment.

The night before I returned the Olds to Bill Horton of Atlanta, the company's zone service manager, I had another whirl with the Gimmick.

"Bet you a Coke," I remarked to my wife Boots, beside me in the seat, "that the lights

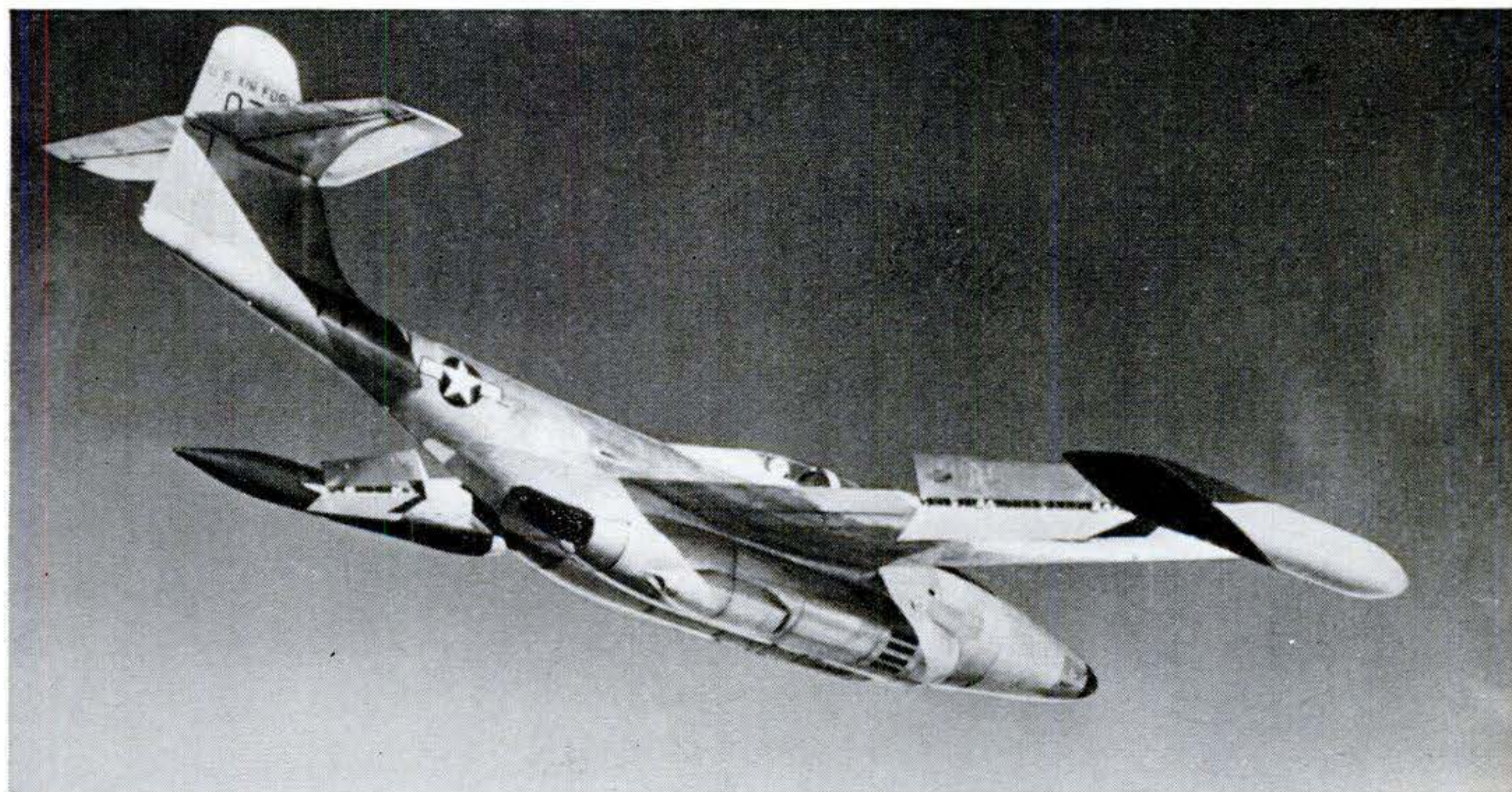
will dim when we drive up behind that car ahead of us."

The street was dark. The other car, parked at the curb, was a light gray. Its body would reflect a lot of light from my own headlights. I rolled up within three feet of it.

Click! Boots bought.

END

## Air Brakes Slow 600-M.P.H. Jet in Dive from 40,000 Feet



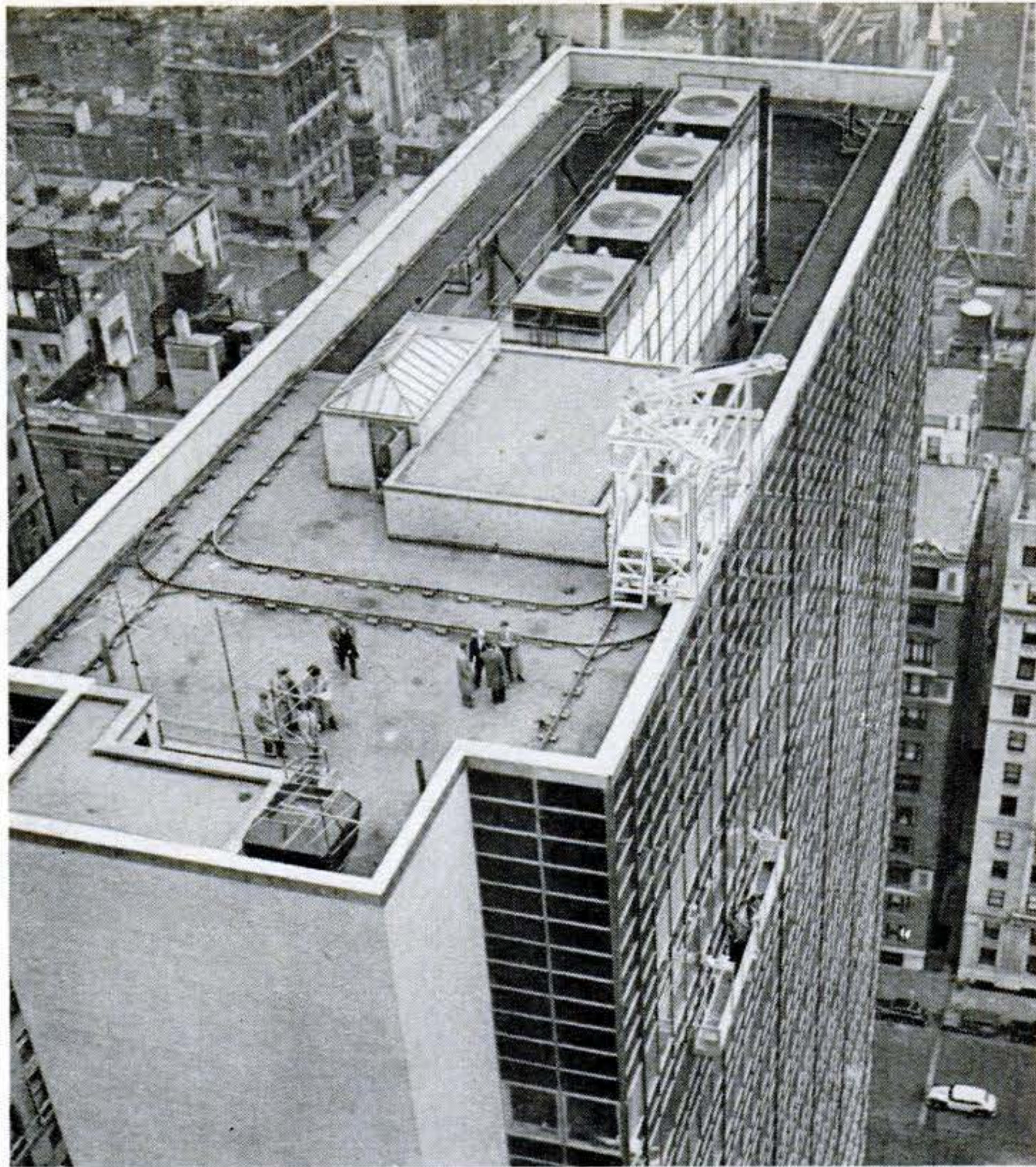
WHEN the pilot of an F-89 Northrop Scorpion wants to land in a steep dive from eight miles up, speed brakes on the wings slow the plane several hundred miles an hour. This first photo of the decelerons in action shows the two halves opened for

braking. When closing in on a target, the opened flaps slow the Scorpion long enough to get in an effective burst of fire from its half-dozen 20-mm. cannon. In normal flight, the two halves close like a clam shell to act as ailerons.

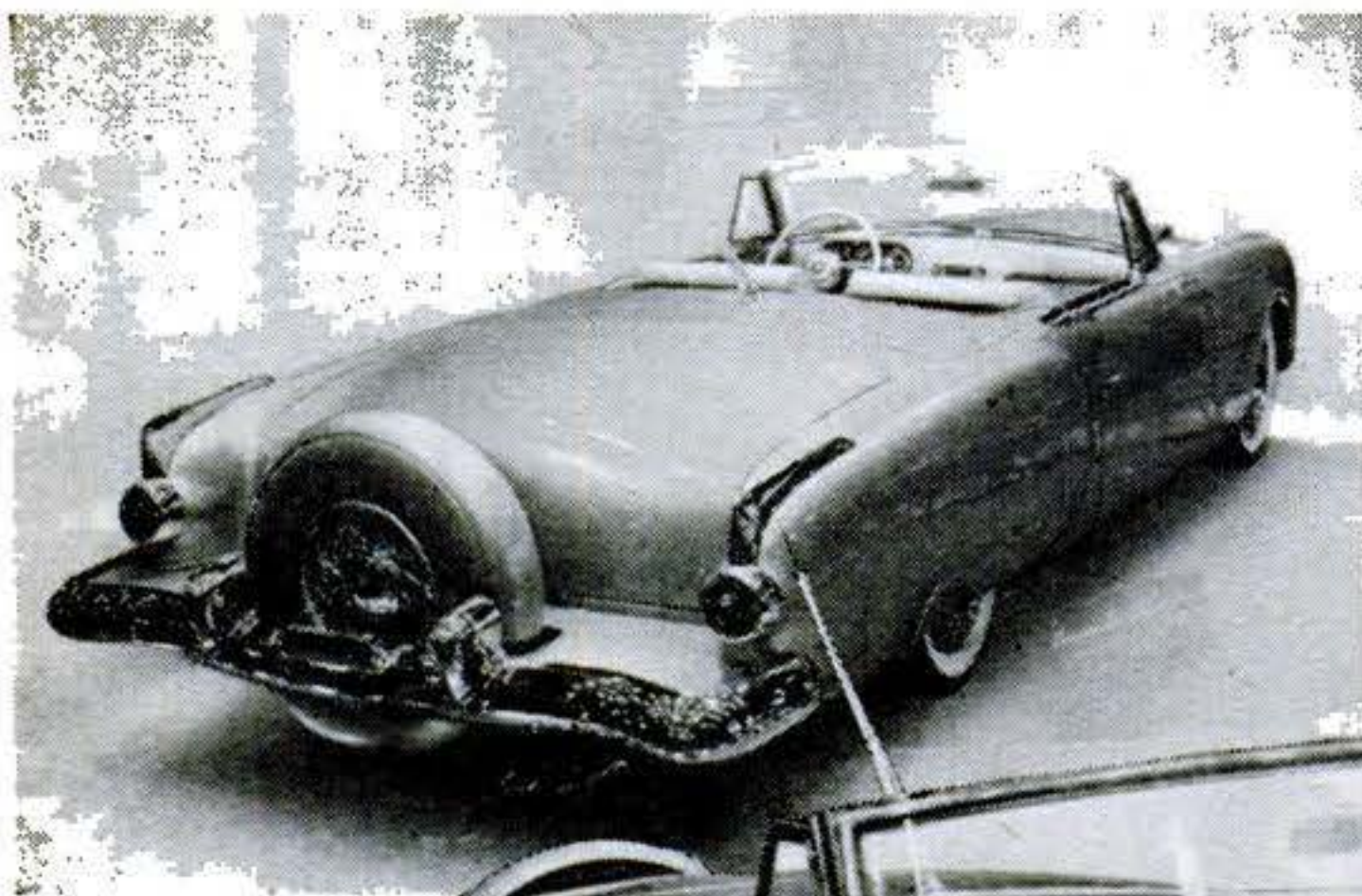
## Window Washers Ride Outdoor Lift

SEALED windows—1,404 of them—make the new Lever Brothers building in New York City mostly glass. To keep it clean, window washers ride a \$50,000 elevator up and down the exterior of the 24-story structure. Suspended from a crane that rides around the roof on tracks, a gondola car crawls its way over the walls, making 35 feet a minute. To eliminate swing and sway, the car is also attached to vertical rails embedded in the building's four sides.

A 10½-ton electric plant supplies power. Riding the elevator and operating it with push buttons, two men can wash the entire exterior of the building in six days. The Otis Elevator Co. built the mechanism.



## Custom-Built Packard Convertible Has European Flair



EVEN the door handles are covered with leather in this low-slung Packard, the Pan American. The luxurious, European-style convertible will be made for sale in limited quantities. Production models will probably have power steering and a four-barrel carburetor to boost the horsepower. The body was designed by Richard Arbib and built by Henney Motor Co., Freeport, Ill.



**UNPRICED** as yet, new car could cost between \$7,500 and \$12,000, depending on number built.





### Carolina Builds Baby Pile

RESEMBLING a wayside shrine, the tiny concrete building above will house the first private atomic pile. North Carolina State College will operate the reactor, built for re-

search, at about 175° F. and a modest 10 kilowatts of power. Its heart will be a stainless-steel cylinder, less than a foot high and thick, containing uranium 235 in the form of uranyl sulfate dissolved in water.



### He's a Fireworks Detective

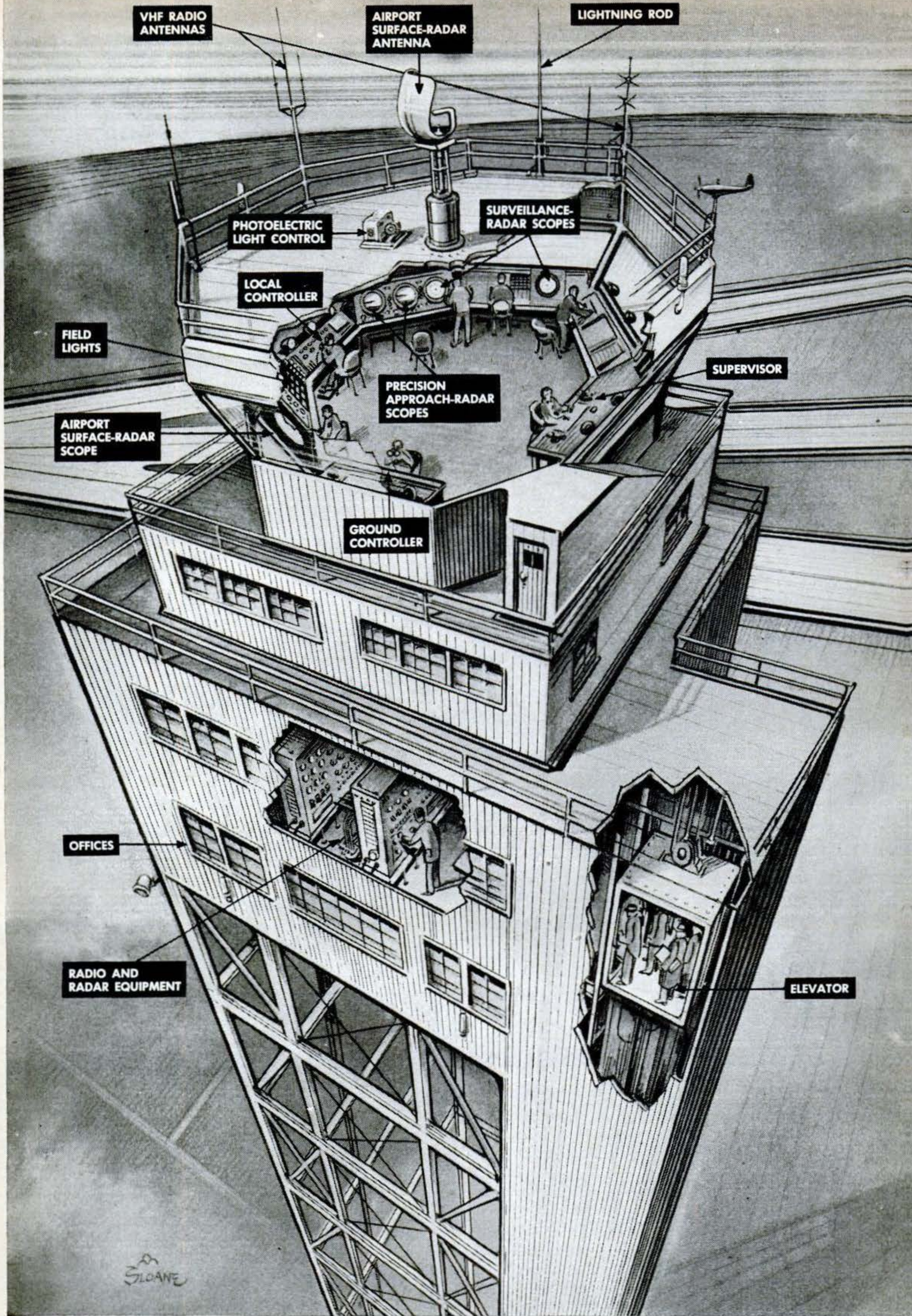
FIREWORKS, collected from roadside stands by the Illinois Society for the Prevention of Blindness, are being analyzed above by Donald O. Landon, an Armour Research Foundation chemist. Illinois law prohibits sale of any fireworks containing more than one grain of gunpowder, the usual amount in "caps." Skyrockets, roman candles and pinwheels are subjected to chemical analysis for proof that they exceed limit.

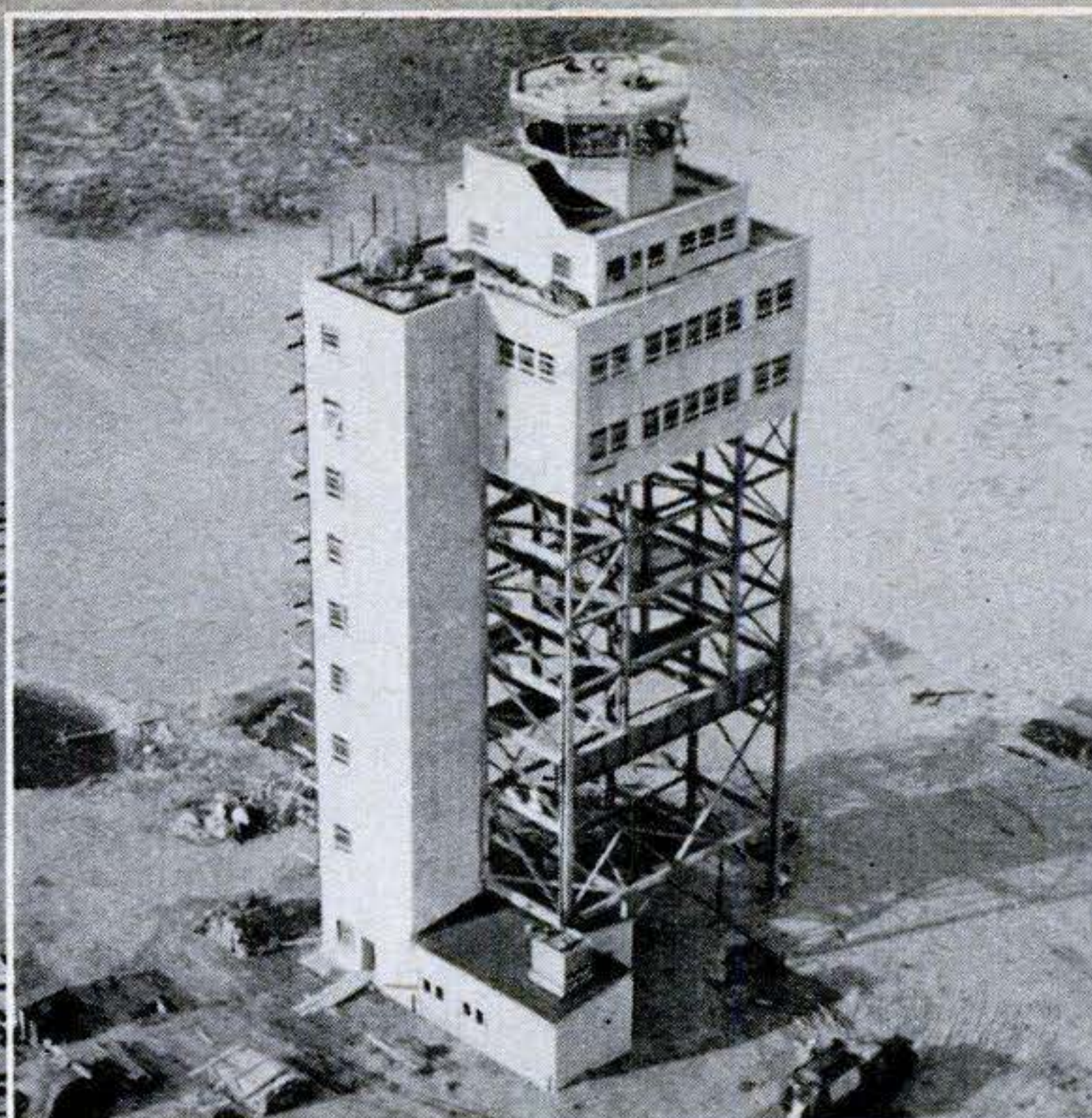


## 75 years ago this month

*Popular Science Monthly* reported:

"PROBABLY, November, 1876, will go down in ornithological history as the time of the famous southward raid of the snowy owls. A number were shot in the city of Boston, and others were seen perched on the churches and house-tops. For several days they were common in Portland, Maine, where not less than one hundred and fifty were shot. Almost everywhere the village taxidermists in the Eastern and Middle States had a harvest of employment."





**HELICOPTER VIEW** of skyscraper control tower in middle of New York's vast Idlewild Airport shows open framework where it will be connected to passenger and freight buildings. Photoelectric control (drawing, left) automatically switches on red warning lights atop buildings when visibility is poor.

# Supertower to Direct New York Air Traffic

**An 11-story building in the middle of one of the world's largest airports will use new electronic aids to help planes land safely.**

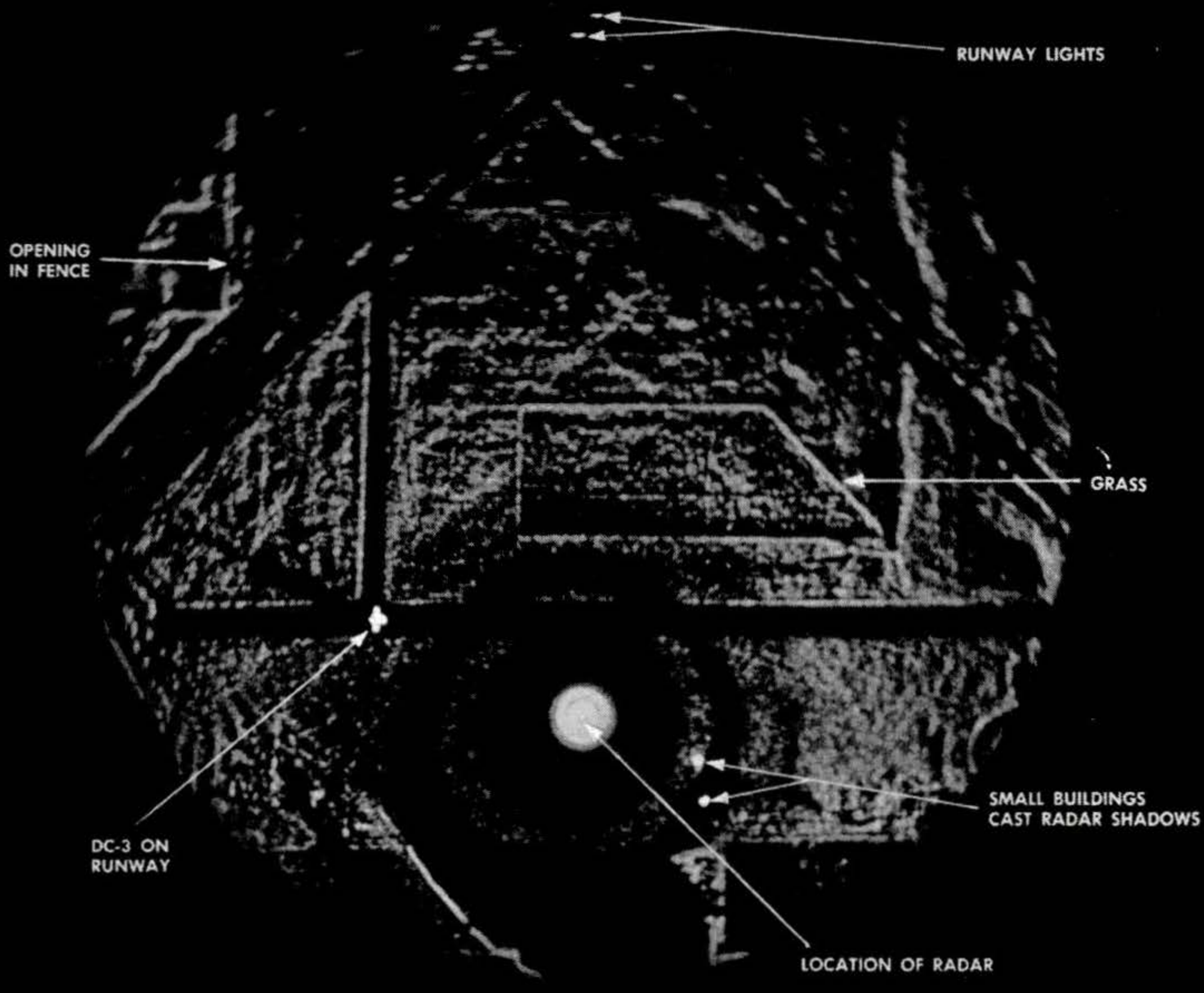
**By Carlton Bucher**

**A**BOUT the last thing that an airplane pilot wants to see in the middle of an airport is an 11-story building. That's exactly what is on New York's Idlewild airport—one of the world's biggest, with a capacity of 1,000 airliners a day.

The building is a new control tower. It had to be put in the center of things and

be built that high so the controllers could see to the edges of the 4,900-acre field. Under low ceiling conditions the top of the tower is lost in the clouds.

For moving more planes safely in and out in bad weather, the new control tower will be equipped with every known device to spot an incoming airplane miles away, follow its movements while the pilot lines himself up with the Instrument Landing



**SMALL DETAILS**—fence opening, grassed area—are easily identified by new Airport Surface

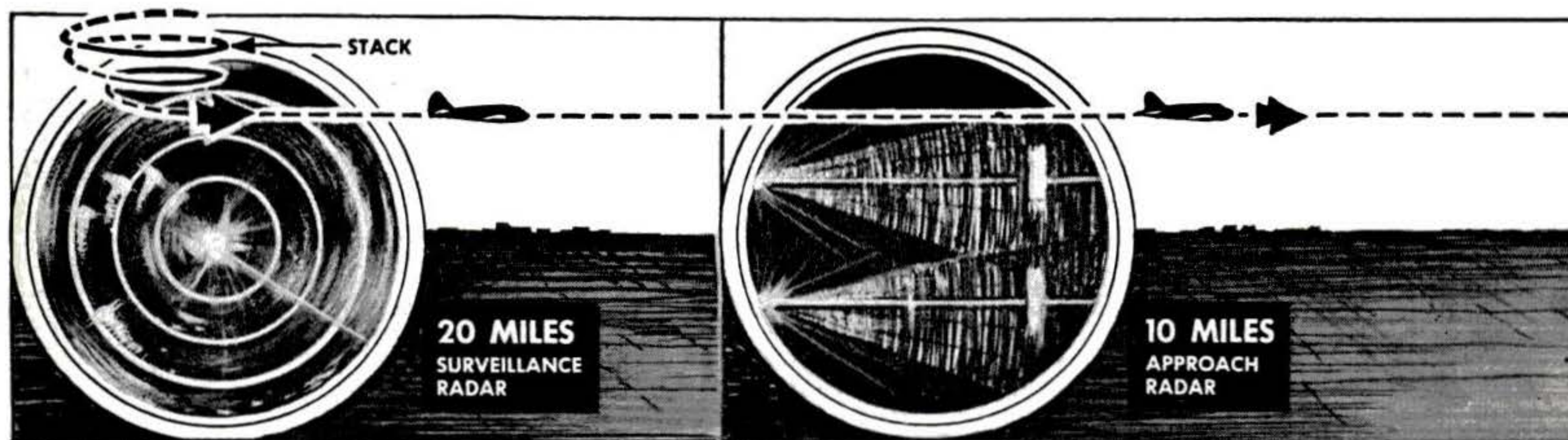
**Detection Radar at Weir Cook Airport, Indianapolis.** Idlewild tower will have it, too.

System, and double check its approach to the runway. The towermen can do the whole thing by just sitting there and watching their radar scopes.

Maybe, when it goes into operation this summer, the tower will dispose of such problems as the one involving the jeep. The airport is so big—nine times the size of New York's La Guardia Field—that a man some-

times can't tell what's happening on the surface of it even with the help of binoculars.

The other day an airport jeep, equipped with two-way radio, was spotted in the distance on or adjacent to a runway. The men in a low temporary control tower gradually worked themselves into a lather trying to get the jeep to answer.



**FOR BLIND LANDING** at Idlewild, plane will come into radar "sight" 20 miles away, then be monitored up to and even after touch-down on runway. Surveillance radar picks it up as

it leaves "stack." At 10 miles a more precise scope locates plane. Top blip shows its elevation, lower blip its azimuth or course (above). If plane deviates, radarman advises

"Get off the runway, get off the runway!" shouted a towerman into a microphone.

It was minutes before an annoyed voice answered, "Take it easy. I'm not on the runway, I'm off to one side of it."

The new control tower will have a gimmick to meet just that kind of a situation. It's the newest thing in radar—aimed at the surface of the field instead of at the surrounding air. Called Airport Surface Detection Radar, the device was developed by the Air Force and the Air Navigation Development Board. It operates in the "K" band with a frequency of 25,000 megacycles and provides amazing definition. On its scope, aircraft appear not simply as pips of light, as in conventional radar, but in complete outline as planes with fuselages and wings. And it will do more. It will show all the runway patterns and fences surrounding the field. CAA technicians of the Technical Development and Evaluation Center at Weir Cook Airport in Indianapolis report it to be so sensitive that it will show a man walking more than a mile away, distinguish between grassed and ungrassed areas of a field, and even detect crows that alight on the runway.

#### *A Boon for Pilots*

Pilots who flew in World War II will appreciate what that means. More than once on fog-shrouded airports, pilots who were talked down by radar operators then found themselves lost on the airport itself and had to ask for guidance to the hangar line.

From the giant tower, some 50 employees of the Civil Aeronautics Administration—controllers, servicing personnel, switchboard operators and the like—will help supervise traffic on the airport's eight long runways.

There will be a full-size elevator to carry employees up and down. There will be a heating plant for winter and air conditioning the year round.

The air-conditioning unit isn't just for the normal comfort of personnel. It's to carry off the heat generated by the ILS system, the Ground Control Approach radar system, surveillance radar and surface-detection radar.

Beginning at the seventh floor and going up, there will be three full stories of offices and radio and radar gear before the glass-enclosed control cab is reached on the eleventh floor.

#### *Static Problem Solved*

Engineers of the Port of New York Authority, which operates the airport, have made allowances for the future construction of additional buildings for passengers and freight and for parking and servicing aircraft. These additional buildings eventually will envelop the tower up to the seventh floor.

They have also allowed for hurricane winds up to 120 miles an hour. The glass in the cab, built sandwich-like with an air space between two double-thick panes, will take that much pressure without breaking. They haven't forgotten about thunderstorms, either. On top of the tower are four 12-foot lightning rods.

The elevator motors are in a pit below ground to keep them from creating static in the radio facilities. For the same reason all lighting in the tower is incandescent instead of fluorescent.

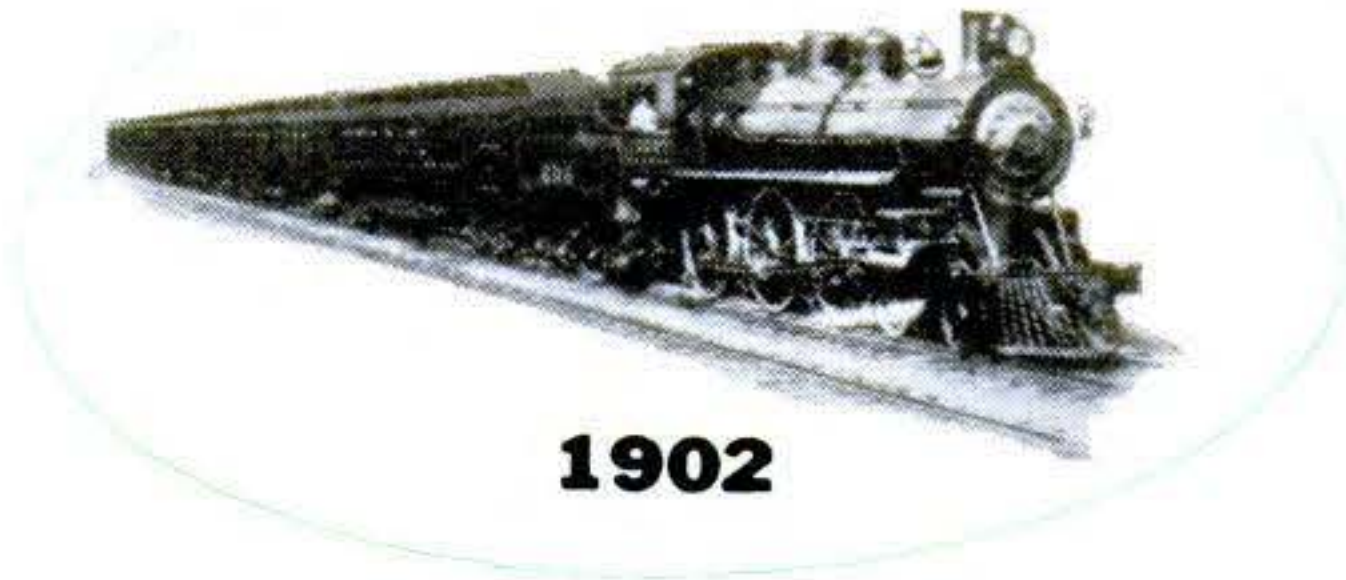
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*Next Month: PSM tells how the world's best truck garage services 50 huge tractor-trailer rigs every day.*



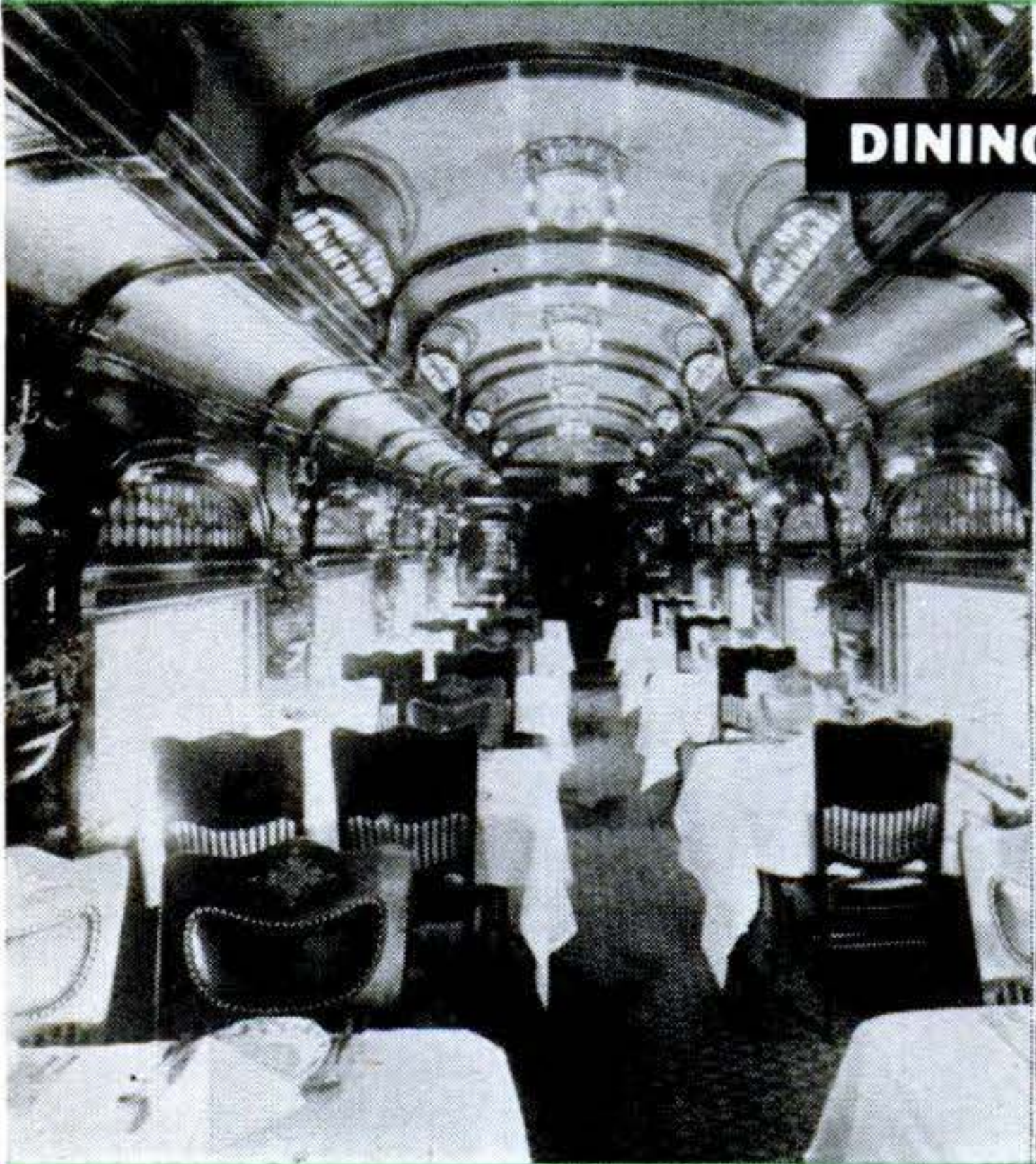
pilot by radiophone. At three miles a third scope gives greater magnification, more detail. Plane is now on final approach (above). Within a minute its wheels will touch runway.

Final radar monitor scope picks up plane as it starts its landing run and follows it as it slows to taxiing speed. Control tower radios instructions for reaching ramp.

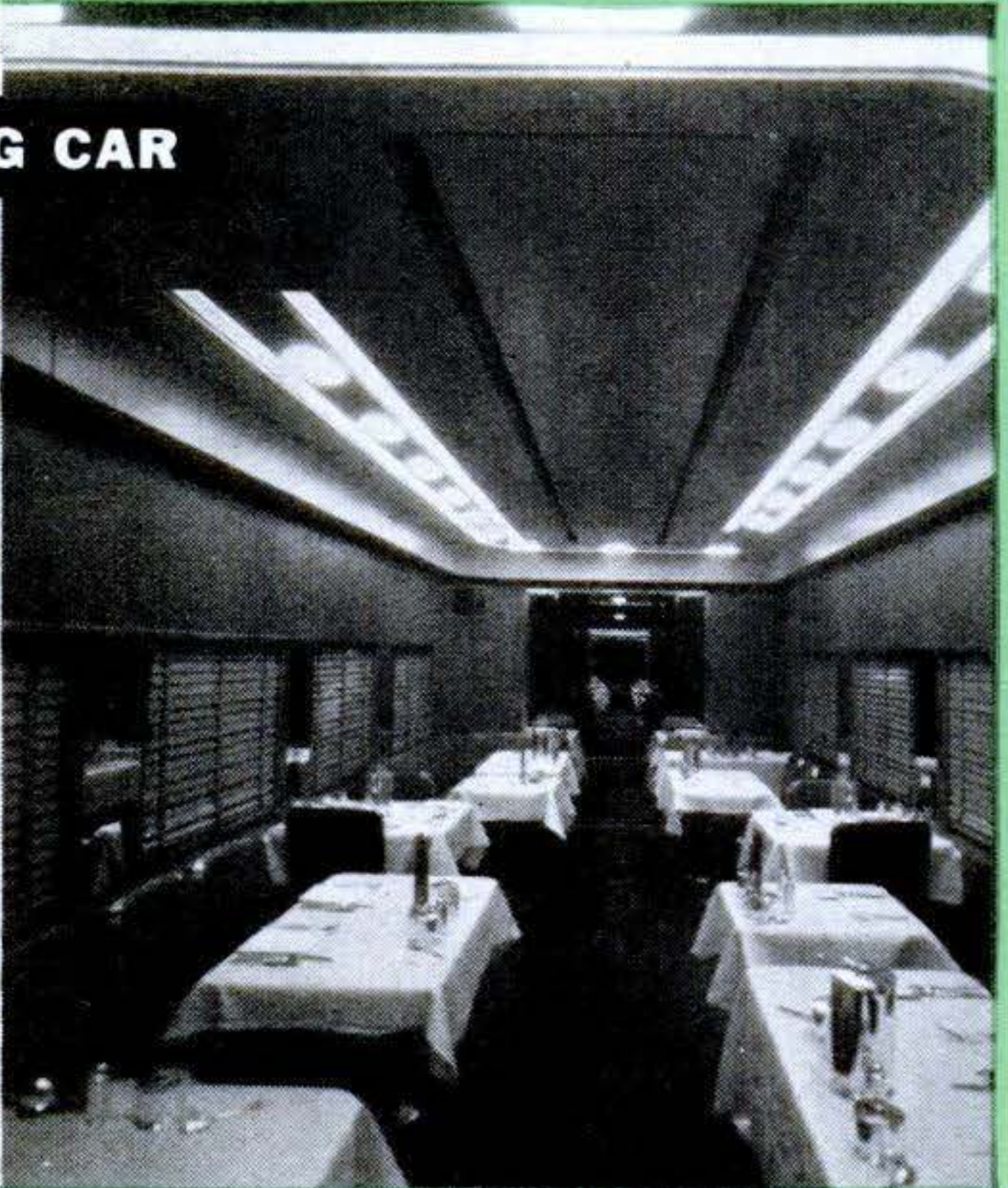


1902

The New York Central's "Century" has changed a lot in its 100-year history.



**DINING CAR**

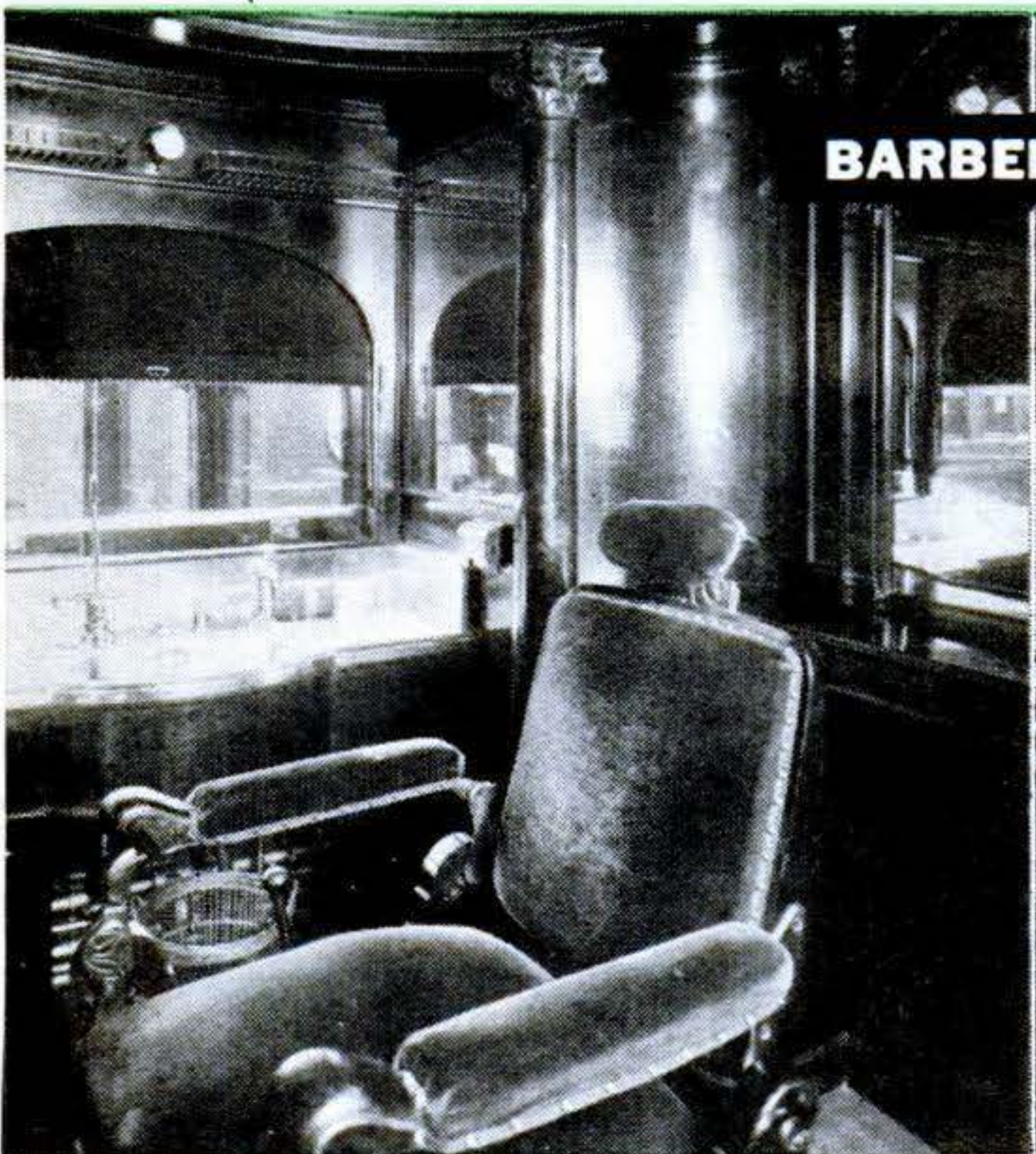


The "Century" has served up 100 years of service to passengers who have seen the locomotive's first run to Chicago on June 18, 1902.

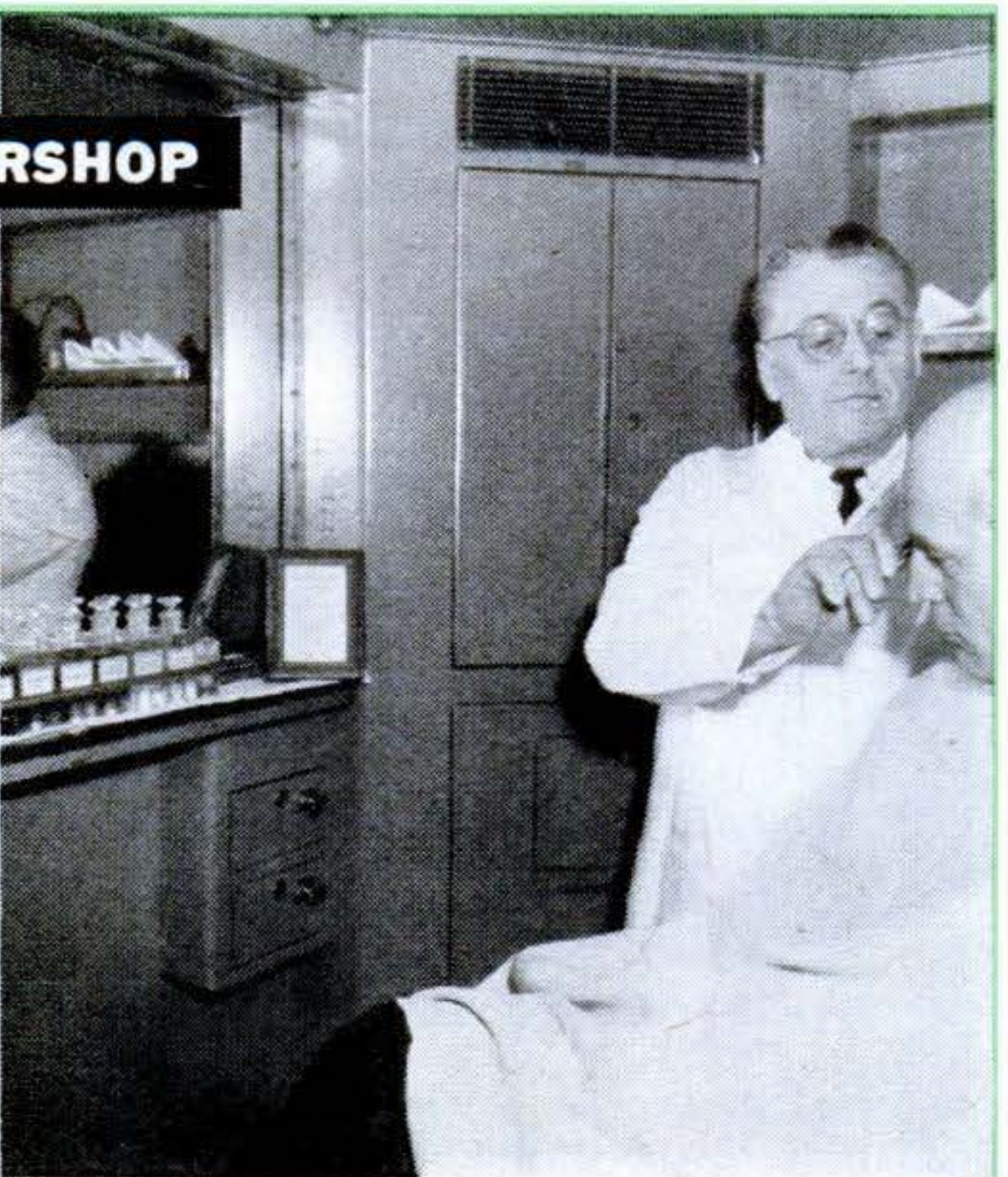
It's still the most powerful engine in the world. It's still the most powerful engine in the world.

The "Century" has served up 100 years of service to passengers who have seen the locomotive's first run to Chicago on June 18, 1902.

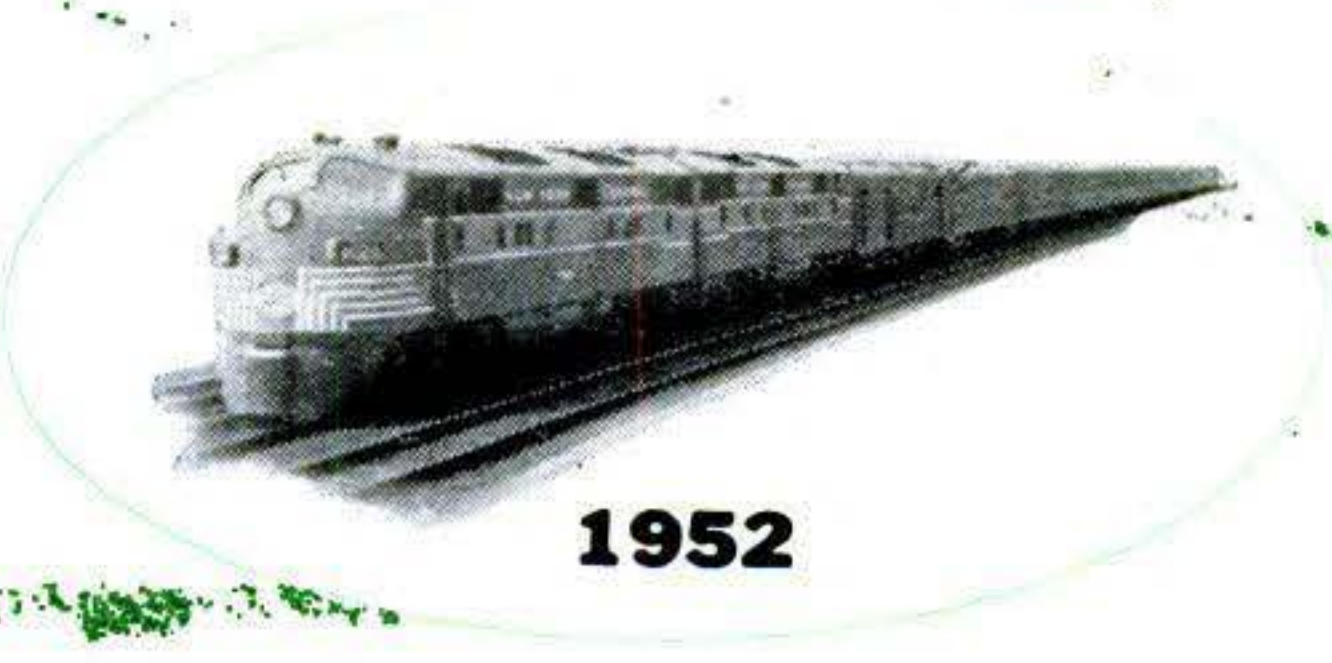
It's still the most powerful engine in the world. It's still the most powerful engine in the world.



**BARBERSHOP**



# Century Trains



**1952**



**OFFICE**



WHEN THE WORLD WAS COST \$115,000, its "office" consisted of a typewriter and a telephone that was largely for decoration.

TODAY'S \$2,000,000 TRAIN provides full postal, editorial, and telecommunication with the world for 435 miles of the mile.

THIS WAS THE RESULT. The Century then carried 42 passengers the 961 miles from New York to Chicago in 20 hours.

STREAMLINED SIMPLICITY marks 1952 Century, which makes 15 1/2-hour run with 160 passengers, crew of 65 and 40 mail clerks.

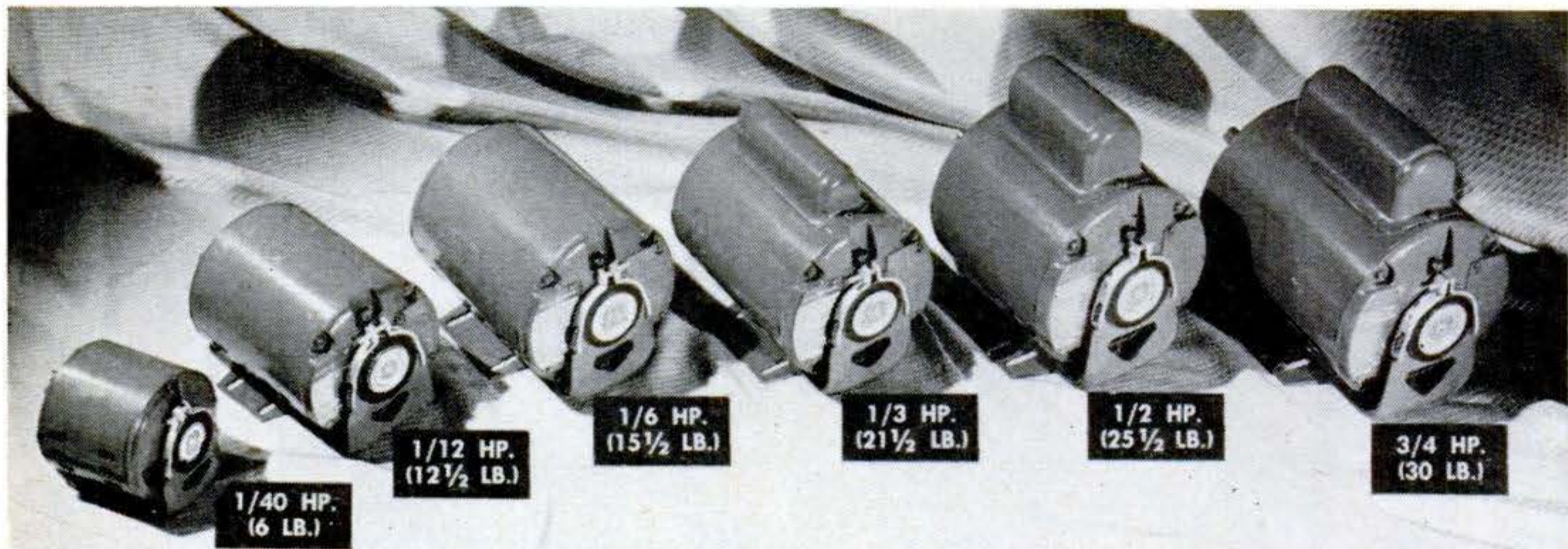
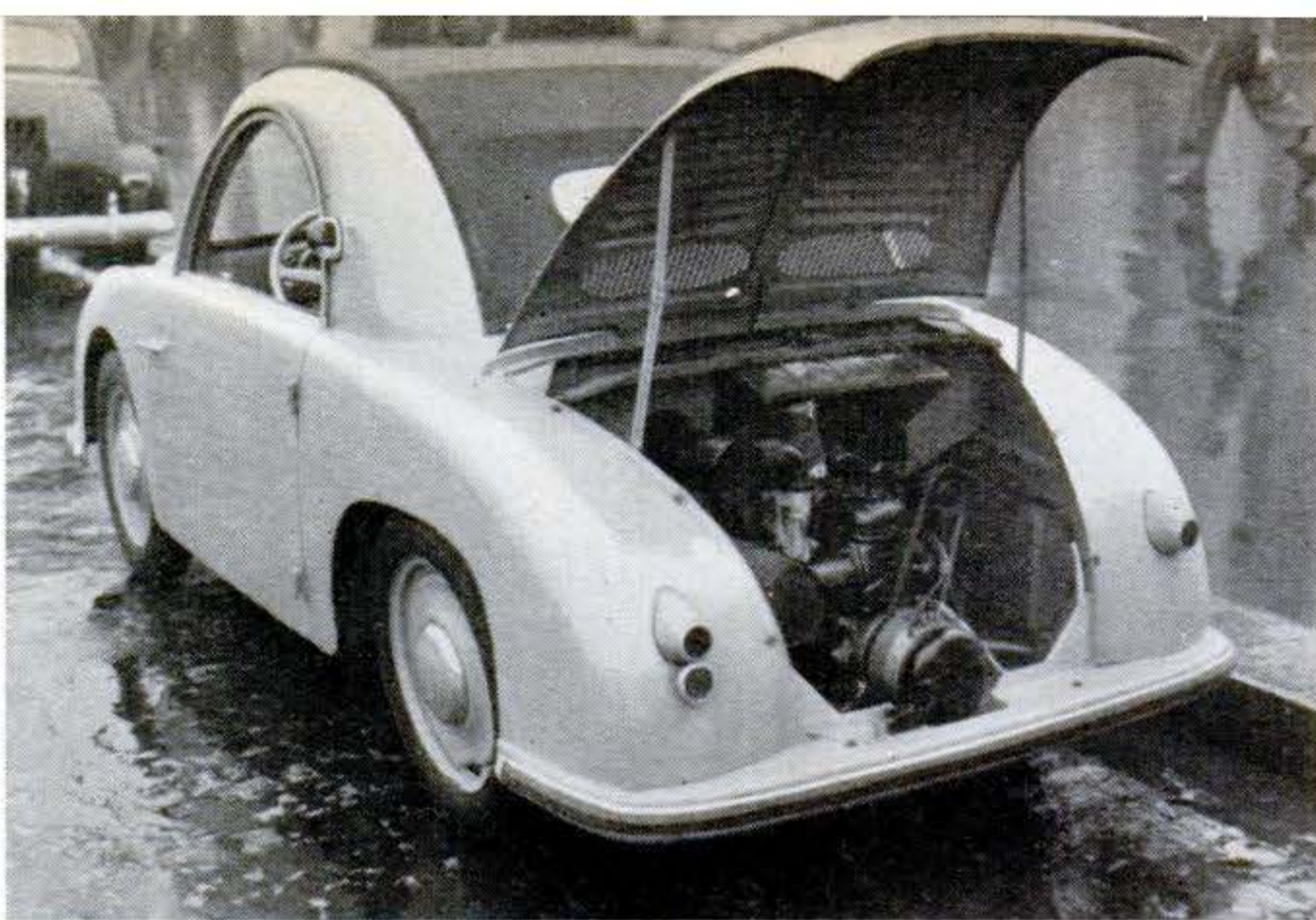


**LOUNGE CAR**



## Baby Rear-Engine Car

THE tiny, arched-roof German convertible at right zips along on less power than the average U. S. motorcycle. At the rear, a two-cylinder, water-cooled engine delivers 14 hp. and propels the two-seater Champion as fast as 55 m.p.h. A nose compartment holds a spare tire and luggage. Only the top's center panel is retractable, leaving sturdy side rails for body strength.



## Aluminum Makes Lighter Motor

LIGHTWEIGHT aluminum helps these new electric motors to yield the power of others twice as heavy. General Electric offers them in sizes from 1/40 to 3/4 hp. The new design,

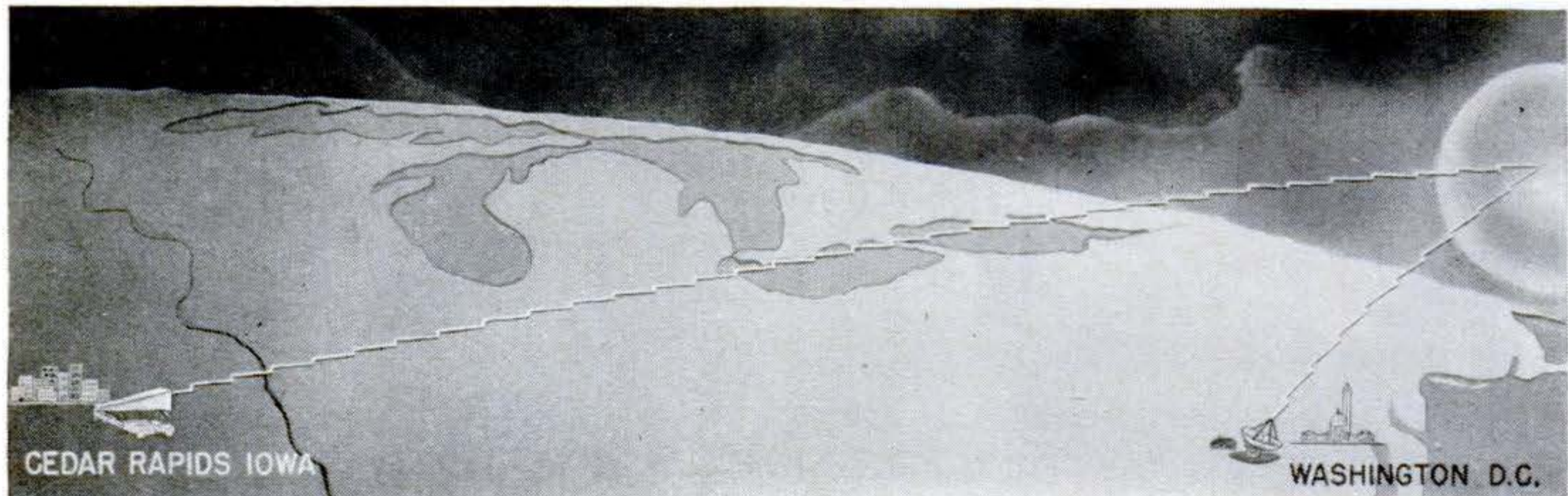
called Form G, saves critical materials and enables more motors to be made from a given supply. About half of all such "fractional-horsepower" motors are used in homes.

## Radio Broadcast from Iowa Beamed to Washington Via the Moon

BY WAY of the moon, the famous message "What hath God wrought" has been broadcast from Cedar Rapids, Iowa, to Washington, D. C.—775 miles by land but nearly 500,000 by the moon route. Proof that the ultra-high-frequency Morse-code message made the long journey was the 2½-minute interval between sending and receiving it, report the test's sponsors, the National Bu-

reau of Standards and the Collins Radio Co.

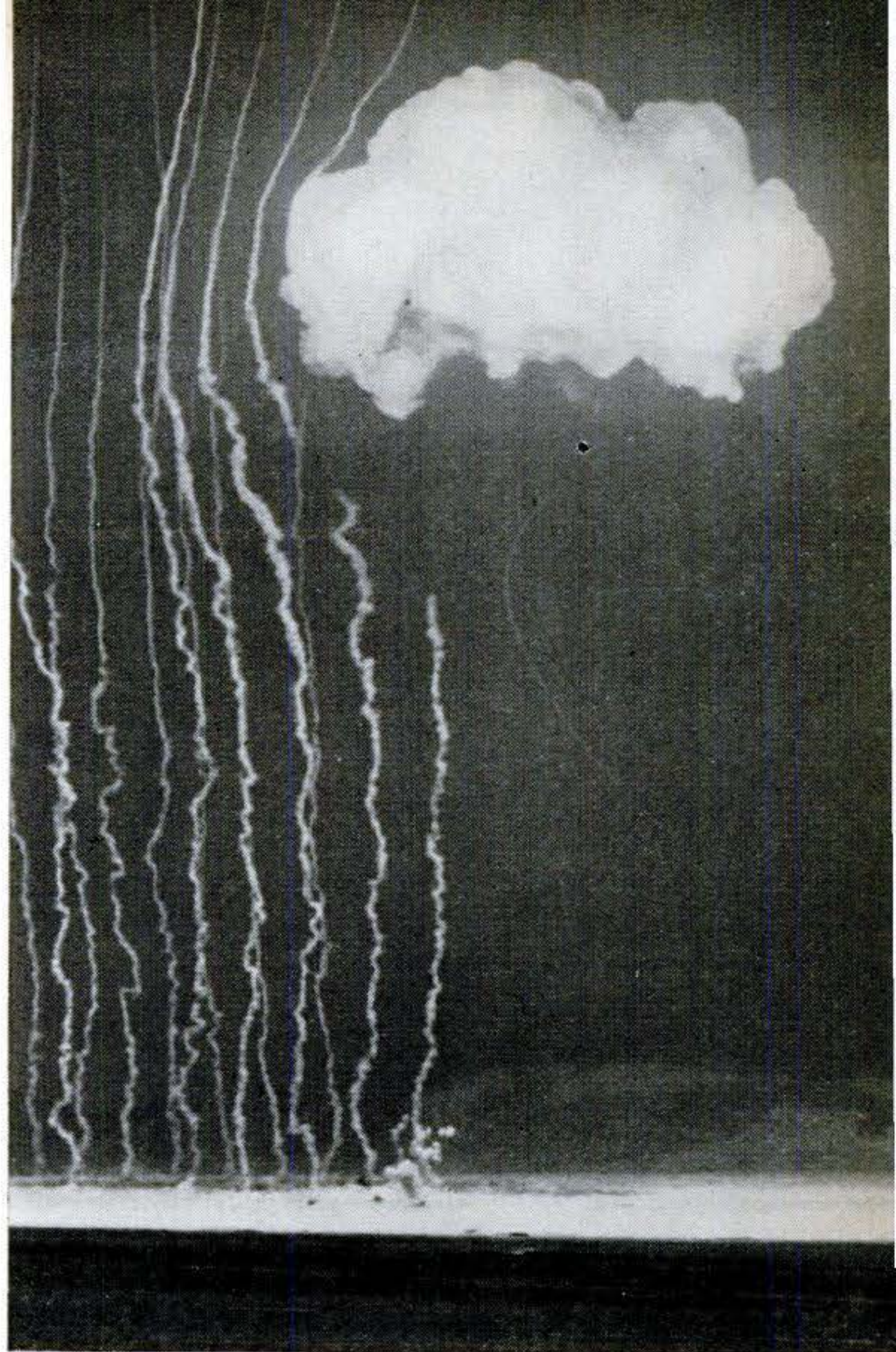
While earlier experimenters have bounced radio signals off the moon, this was the first use of the satellite as a relay station to send an actual message to a distant point. It suggests that communications might be maintained with UHF signals via the moon when electric storms disrupt ordinary long-range radio transmission.





# How New A-Bombs Are Tested Safely

**ATOM BOMB** at right exploded April 22. Smoke streamers from rockets help gauge spread of fireball. Artist Reynold Brown's impressions of this scene, sketched on the spot, appear on the next two pages.



**The experts have a slot machine in Nevada that pays out information when the deadly bombs are dropped into it.**

**By Volta Torrey**

ONE atom bomb in Japan killed and wounded more people than there are in the whole state of Nevada. But even more powerful atom bombs now can be exploded over the heads of troops in Nevada without so much as singeing a man's hair.

This can be done because the Atomic Energy Commission has built a huge, new kind of slot machine in Nevada. It is 16 miles wide and 40 miles long. In this desert tract, there are 2,200 miles of signal lines, 110 miles of power lines, 100 miles of paved roads, a telephone network, towers up to 300 feet high, and dugouts that cost up to \$600,000 apiece. All told, about \$8,600,000 has been spent to turn this small part of America into a safe place for experimenting with new atomic weapons.

When an atom bomb is dropped into the slot, cams turn, lights flash, instruments

click, the mountains recoil and rumble. Even the desert plants catch fire as a mountain of dust rises toward the fireball that finally forms a smoke ring and floats away. Then men in cars, planes and helicopters plunge into the dust to collect nuggets of information.

### *A Bull's-Eye from Six Miles*

The bombs are dropped into a bull's-eye of white (lime) and black (asphalt) rings around a white X on the flat, brown desert floor. It is a target several hundred feet wide, which a bombardier can hit every time from an altitude of six miles

Before a bomb leaves a plane, a few fenced-in acres 10 miles from the target hum with activity. This is the control center of the Nevada Proving Ground. It is the hub of an intricate and far-flung system of weather stations, the point from which the

**[Continued on page 264]**



## Control Point for Atomic Experiments

This fenced-in area on the side of a Nevada mountain is the nerve center of the AEC's proving ground for atomic weapons. Instruments throughout the desert are operated from the building at right. This building is

about 10 miles from the point where the bomb shown here went off. Many of the objects which are shown clearly in this sketch could not actually be seen from the control point without binoculars.

## How Atomic Bombs May Be Used on Battlefields

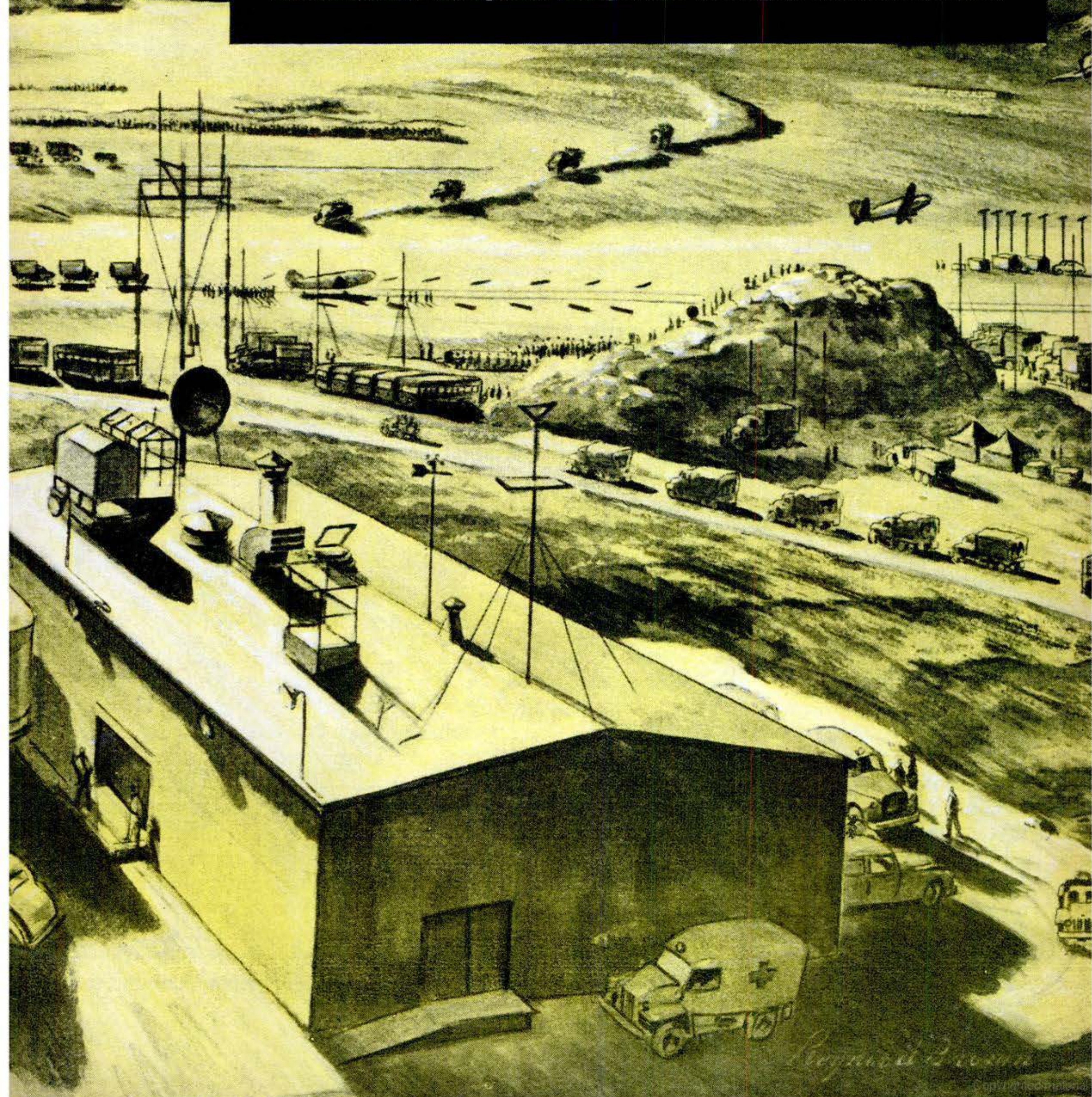
Last April 22, near Las Vegas, Nev., the U. S. Army experimented with an atomic bomb as a tactical weapon for the first time. This sketch made at the scene by Reynold Brown depicts part of that day's activity.

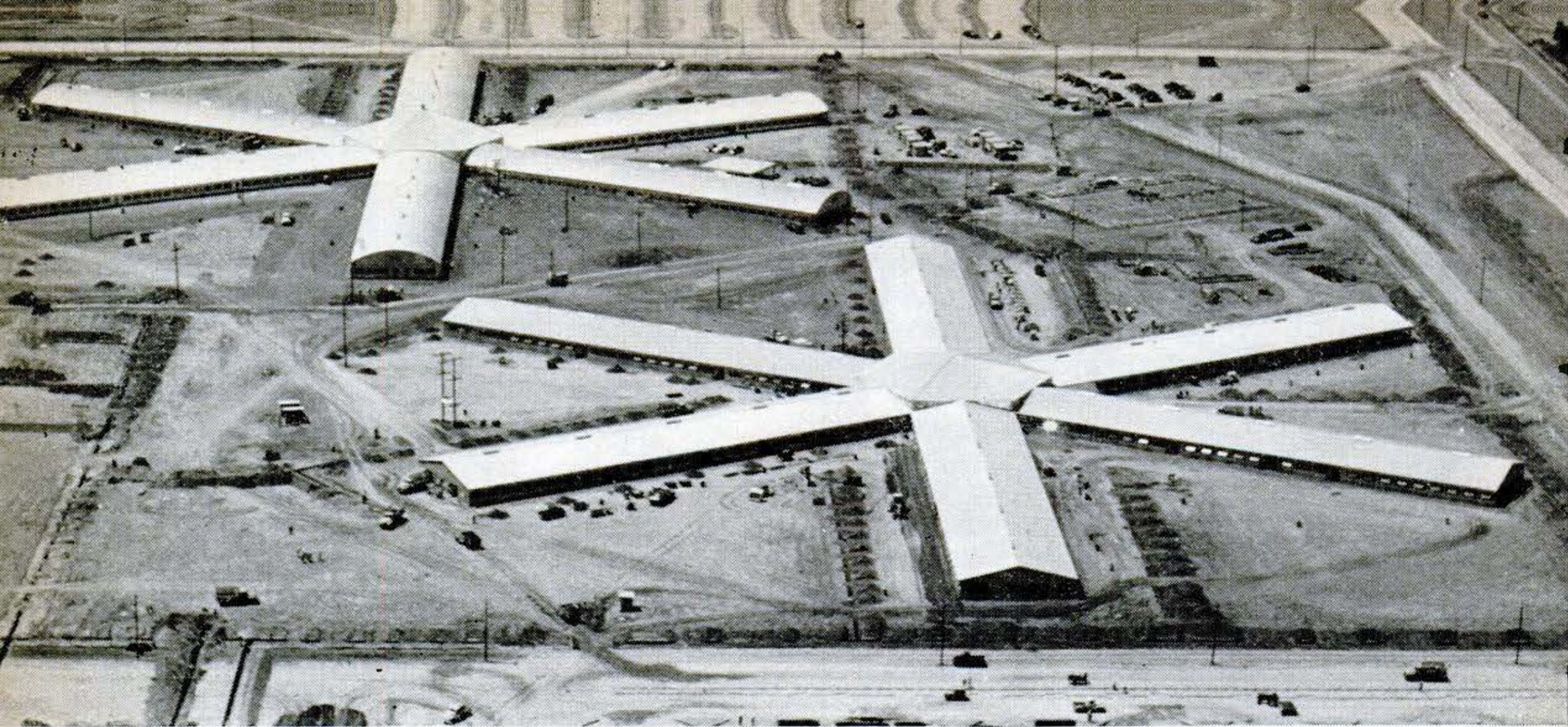
Civil-defense officials, newspapermen and TV cameramen were perched like monkeys on the rocks of the hill that you see below.

Soldiers crouched in foxholes between these observers and the target until a few seconds after the explosion. Then they climbed out and followed leaders with Geiger counters toward the target. They were asked to imagine that the target had been an important military objective in which the enemy was strongly entrenched, and which they were to attack and capture as quickly as possible.

While most of the troops advanced toward this objective, the paratroopers among them withdrew to planes in the rear, climbed aboard, flew around the cloud of dust to the far side of the target and dropped to attack from that direction.

Airplanes, tanks, jeeps, artillery and other military equipment were parked between the target and the men's foxholes during the explosion. Much of this equipment was damaged, but the advancing troops found that most could be repaired enough to be used again within a few hours.





**LIKE GIGANTIC STARFISH**, these temporary administration buildings spread their steel-clad tentacles across a flat expanse on the east bank of the Savannah in South Carolina.

## Building the H-Bomb Plant:

Biggest Construction Job

**It will take 45,000 men to build our top-secret Savannah River Project . . . Here's an eye-witness report on what's happening.**

**By Herbert Yahraes**

GLANCING across the miles of field and forest along Route 19, 15 minutes' drive north of what is still on the maps as Ellenton, S. C., you get a weird picture of cranes, draglines, and other machinery jutting above a low ridge like a line of gigantic jackstraws. They mark one of the half-dozen areas, scattered over 315 square miles, where 28,000 workmen—soon to be 45,000—are toiling on what the Atomic Energy Commission calls the biggest construction job since the Panama Canal.

Officially, it's the Savannah River Project. The term "H-Bomb plant," commonly used elsewhere, is rarely heard here. It may be that the AEC has finally got across its argument that this is *not* a bomb plant. The plant is to turn out materials that can be used in bombs, either A or H, the AEC says, but "no atomic weapons as such will be made in South Carolina: materials produced will be utilized elsewhere."

Big as the thing is, it bulges into public view only a very little. From one point you can glimpse, floating on the skyline, a huge steel skeleton—big enough, it looks like, to hold a couple of Madison Square Gardens. From another point, miles away, you can see black tubular structures poking skyward like a cluster of supersize organ pipes.

### *Cameras Are Contraband*

That's about all, except for T-1 and T-2. You can't miss these because they hug the ground right alongside the highway and are shaped like six-armed starfish, with each steel arm several hundred feet long. Here in these tentacles, a European magazine reported recently, the bomb parts are made and in the center they are put together.

But step inside one of the starfish and you find that the center is mostly a reception room. Facing you as you come in is a big placard headed *Contraband*. It says that cameras, bombs, field glasses, electronic sending and receiving devices, dangerous



**TRAILER TOWN** near Augusta, Ga.—one answer to workers' housing problem—contains

1,000 28-footers renting for \$82.50 a month. Three trailer parks like it are on the way.

# Since the Panama Canal

weapons, alcoholic beverages, explosives, and half a dozen other items are unauthorized and that persons carrying them may be punished. Over at the left a couple of trim, polite women are waiting to record your name, address, citizenship and business, and then—if someone down one of the long tentacles phones he will see you—to clip a badge to your lapel, hand a passport to a guide, and send you off.

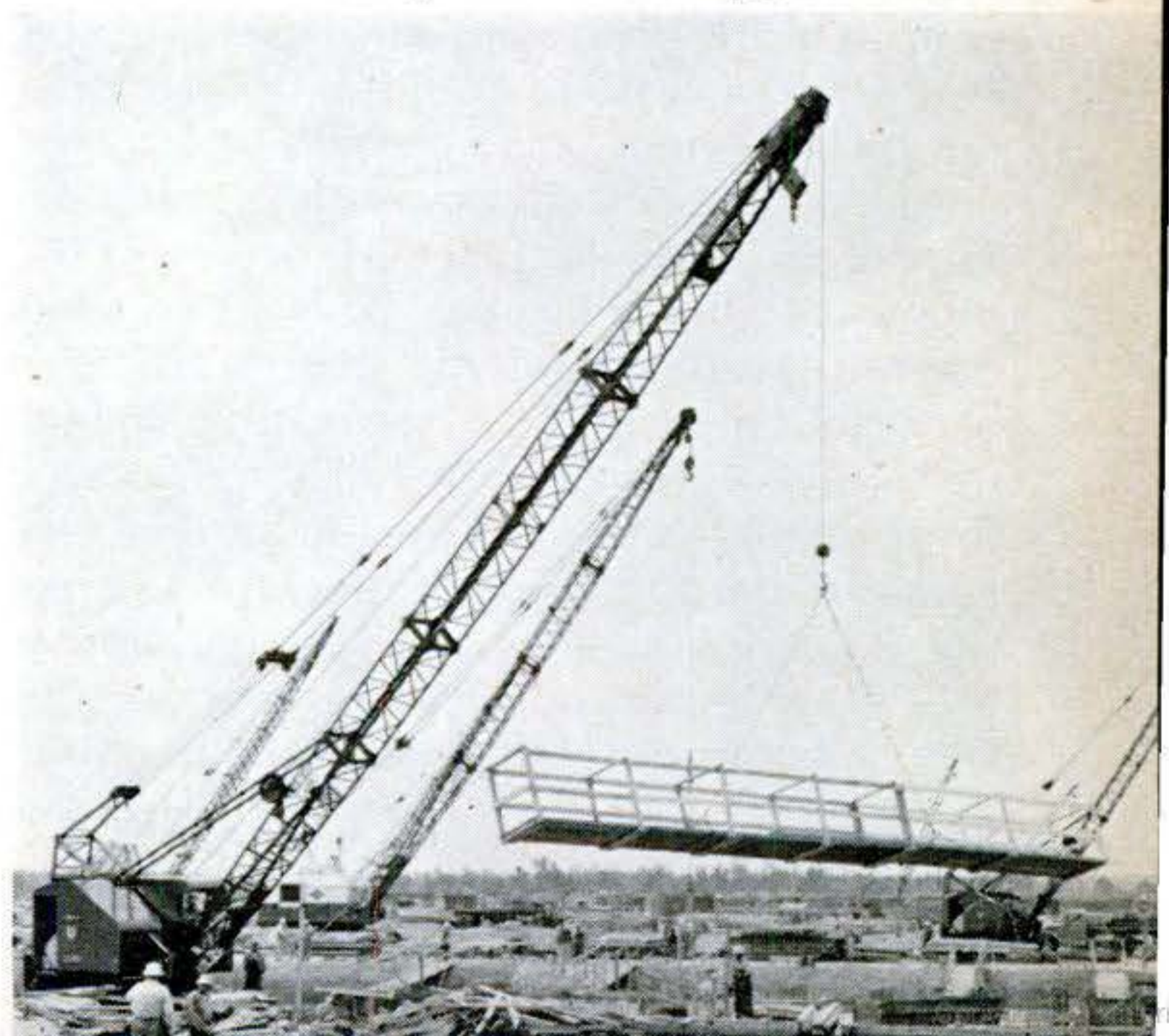
## *Credentials Are Carefully Inspected*

You go through a gateway where a khaki-clad, revolver-carrying guard looks over your guide, your passport, your badge, and you, and then you walk a few steps and a second guard repeats the inspection. After that you are free to follow the guide down one of the long arms of the building. It turns out to be nothing more extraordinary than an office-lined corridor, for T-1 and T-2 are the temporary administration buildings, and, like administration buildings everywhere, are filled with men and women doing paper work.

E. I. du Pont de Nemours & Co., the big chemical firm that has the government contract, started work January 11, 1951. Until

recently you could have kept fairly close tabs on what was going on. You'd be driving along Route 19, say, south of Aiken, and in the course of a dozen miles you'd see maybe a dozen new roads shooting off—apparently to nowhere—through sandy soil or red clay. If you wanted to follow them, all right. Not now, however; things at the end of those roads are taking shape. To travel them now, an outsider must be in a Project

**CONSTRUCTION GETS UNDER WAY** at the Atomic Energy Commission's H-bomb materials plant. This was one of the last photographs released before the security veil was dropped.



car driven by a Project escort and must wear a long tag that tells what he looks like and contains a signed promise to reveal no details of construction.

It will give away no secret to report that at one place in forbidden territory half a hill has been sliced off and that on the raw red face of the remaining half, men suspended on ropes from the top, like Alpine climbers, are digging little holes. Getting ready to blow the rest of the hill away? No, just planting some stuff to prevent erosion.

And no one will object to the statement that I saw some odd-looking, apparently identical structures, asked my guide if they had a name, and was told politely that they had—but it would be unfair to ask what.

No detail, however, is likely to be as memorable as the whole, big, general picture. In the good old days of a year and a half ago, this huge, mostly wooded area—roughly 20 miles north and south and 20 east and west—was home for 6,000 persons. Most of them lived in or around a few villages and crossroads hamlets, and you could travel miles without seeing a sign of life except a house or two.

### *Whole Vast Area Looks Deserted*

Now, of course, you don't see even those. From the roads across the Project that are still public—they're to be closed sometime this summer—you still do see a few cornfields, the stalks and leaves gray and rattly, and a few patches of cotton, with a scattering of white bolls still clinging to the dead plants. You see a clearing where chinaberry trees are spaced around a patch of bare, packed earth, and you can guess that a cabin stood there.

On the face of it, this lonely region is lonelier than ever—as deserted as a bombing range. But deep in the woods, out of sight and sound of the public roads, it now swarms with men and machines—leveling ridges, disemboweling the earth, throwing up steel skeletons.

The AEC escort gives you the figures. The Project is using 75,000,000 board feet of lumber, 1,250,000 cubic yards of concrete, 85,000 tons of reinforcing steel, 25,000 tons of structural steel. It is excavating 20,000,000 cubic yards of earth, drilling 60 wells for drinking water (the Savannah River will supply water for the plant processes), stringing 95 miles of electric lines, building 66 miles of railroad, and putting up 250 factory, laboratory, office and other buildings.

In an hour and a half of driving—during which we stopped half a dozen times to let guards check on us—we covered 38 miles, yet we got to fewer than half the places where sections of the plant are going up. To link all these sections, du Pont has to build 105 miles of new roads.

### *Where Will 45,000 Workers Sleep?*

Peak employment is expected to be reached by September. Du Pont then is to have more than 45,000 workmen on its payroll, with weekly wages running in the neighborhood of \$3,000,000.

Forty-five thousand men, many with families: Where are they going to sleep?

By and large, the AEC and du Pont have left that answer to private enterprise. There won't be any government town, like Oak Ridge, Tenn., or Los Alamos, N.M., even for the permanent employees.

Private enterprise has come up with a lot of answers: cots in the Augusta YMCA for a dollar and a quarter a night; rooms in Augusta rooming houses for \$8 and \$10 a week—if you share them with four or five other men; a few one-room prefabs you can buy outright for \$650—and they don't look bad after they're painted and set nicely on a lot; a few cabins, motor courts, tents.

And, most of all, trailers—nobody knows how many. As this is written, perhaps 7,000 privately owned ones cluster in several dozen trailer parks all over the booming area: in fields, pecan groves, farmyards and one in Aiken itself.

### *Trading New Towns for Old*

Drop into Nu-Town Trailer Park. It's part of New Ellenton, a long stretch of trailer parks, grocery stores, cafes and houses along Route 19, a little north of the Project's northern boundary. Aiken is about 10 miles farther north, and the sleepy, sunny, old, original, gone-forever Ellenton about 15 miles south—15 miles distant in space, but an era away in time. Some of the houses were moved up from there.

Nu-Town occupies what used to be a sandy field, laid out now into perhaps half a dozen streets with eight or 10 trailers to a street. Each trailer has a concrete apron and a little yard, and in most of the yards the grass is doing well.

Halfway down one of the streets a big fellow is washing a yellow convertible. He's a crane man, he tells you, from upstate New York. Headed for Florida last winter but

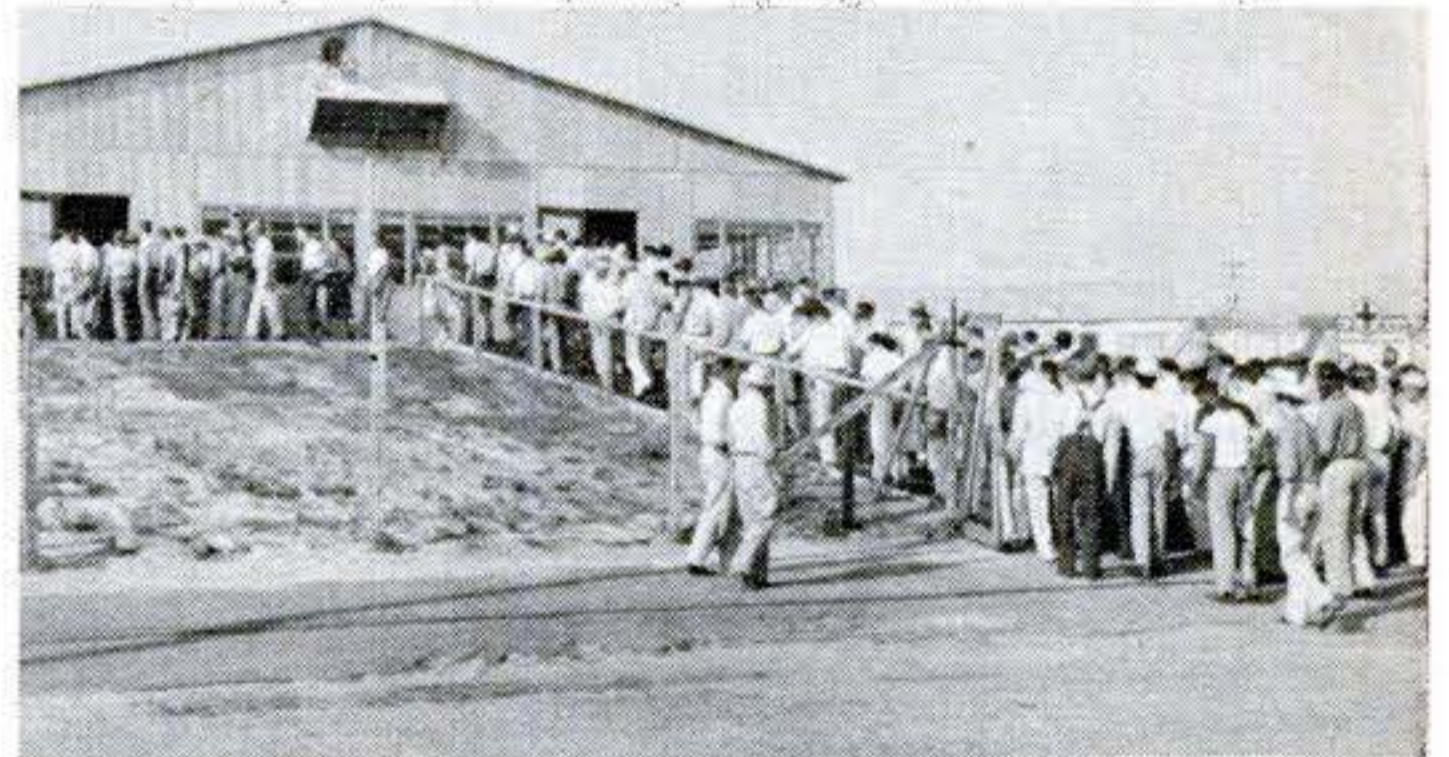


**DESERTED VILLAGE.** The sleepy little town of Ellenton, S. C., shown here, no longer exists.

It once boasted a population of 600 persons, but all were moved out three months ago.



**MOVING DAY.** Around 1,000 buildings were moved out of reservation. Homeowners sold houses and land to AEC, then bought houses back, transported them to new locations.



**JOB APPLICANTS** line up like World Series fans outside du Pont's employment office at SRP site. H-boom will hit peak this fall with 45,000 men on a \$3,000,000 weekly payroll.

stopped off here, for a while. Rented a trailer—\$15 a week plus \$5 for parking space—because he likes being close to the job. Even so, traffic is so bad that once in a while it takes him an hour to cover the 15 miles to work.

#### *Trailers—Some Like 'Em, Some Don't*

Down near the end of the street, a young woman with a baby in her arms and a seven-year-old girl at her side starts out for the concrete-block building that houses the community washroom. Her husband's a road builder, a grade foreman, from Birmingham. She doesn't like trailer life—not when you have to pay \$20 a week rent and don't have your own bathroom. But what's a person to do?

Over in the next street a tanned, husky, graying-haired man who introduces himself as E. M. Biddison from Athens, Ohio, has an answer to that question: Buy your own trailer.

The Biddisons themselves had wanted an

apartment when they arrived a year ago, but all they could find was one room and a kitchenette, in Augusta, at \$95 a month. "So I decided to buy this," says Mr. Biddison, "figuring that after three years I'd have something to show for my money."

"This" is a 35-foot Ironwood Trailer Coach, with a bedroom, bathroom, kitchen and dining area, and a living room that becomes a second bedroom. Trailers like it sell for around \$4,300—one-third down and the balance over 42 months.

#### *Prefabs Inspire a Bit of Poetry*

The Biddisons' son, a lanky, dark-haired young man, has found another answer. For the last few weeks, he and his wife and their baby have been sharing the trailer with the older Biddisons, but as soon as the financing papers go through, they're moving into a prefabricated house in Aiken.

Some people still take a slightly snooty attitude toward prefabs: for example, a

*[Continued on page 228]*

# Aids to Modern Living

**1. Vacuum Cleaner.** Small enough to fit on a stair tread, this tank cleaner empties in seconds—just press a button, raise the lid and throw away the filter bag. The Universal Jet 99 comes with a special rug nozzle that picks up lint easily.



**4. Coffee Maker.** Demi-tasse coffee is brewed in about four minutes in this continental coffee maker. An alcohol flame makes steam that passes through the coffee to produce a concentrated brew called "caffè espresso." Italian, French or American drip-ground coffee can be used in the urn.

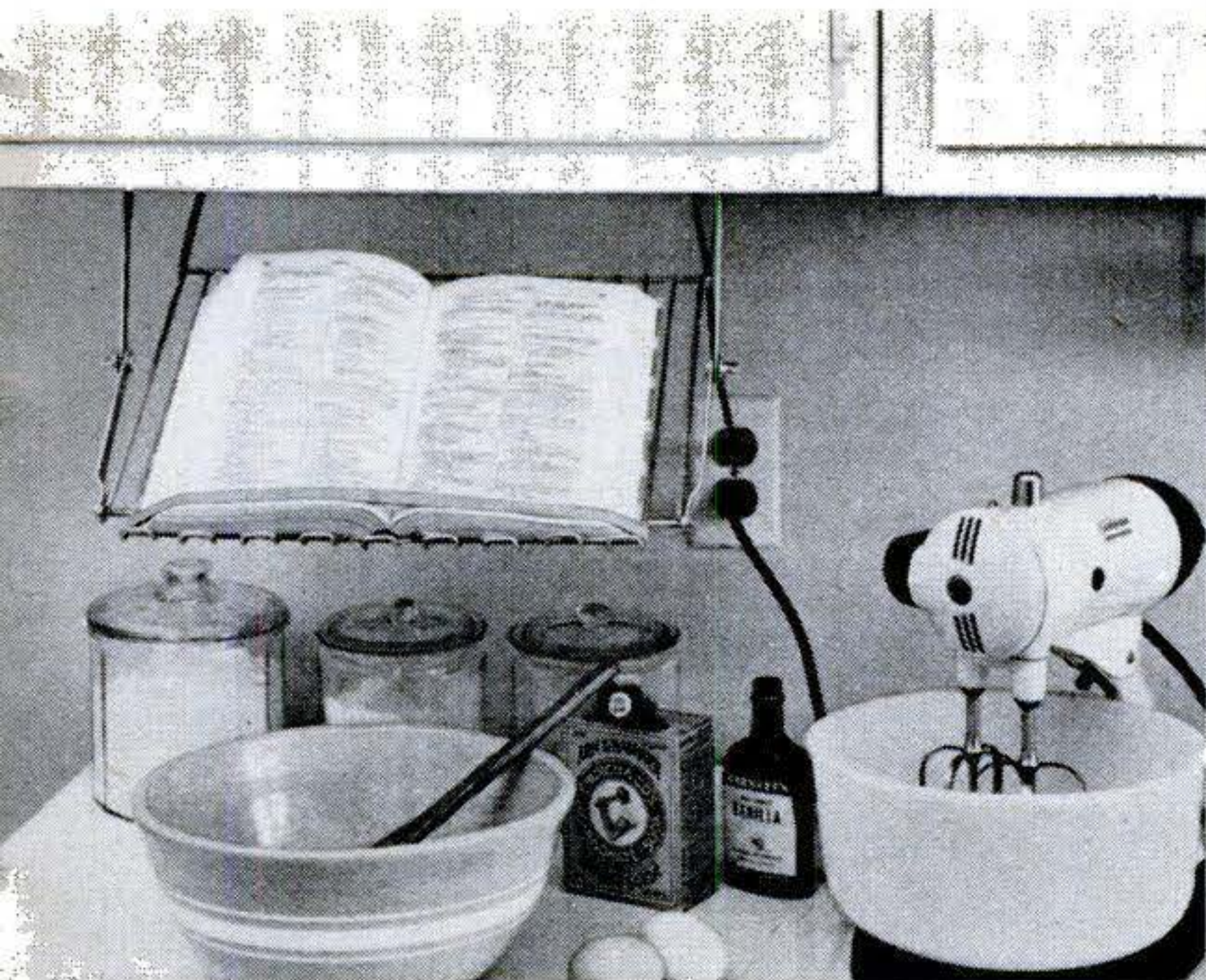


**5. Catchup Server.** Squeeze this plastic tomato and the catchup flows out in a steady stream. Fingertip pressure controls speed and amount of flow. The top greenery lifts off for filling the Squeezit container, which holds a full bottle of catchup. It washes itself clean when squeezed under the water tap.

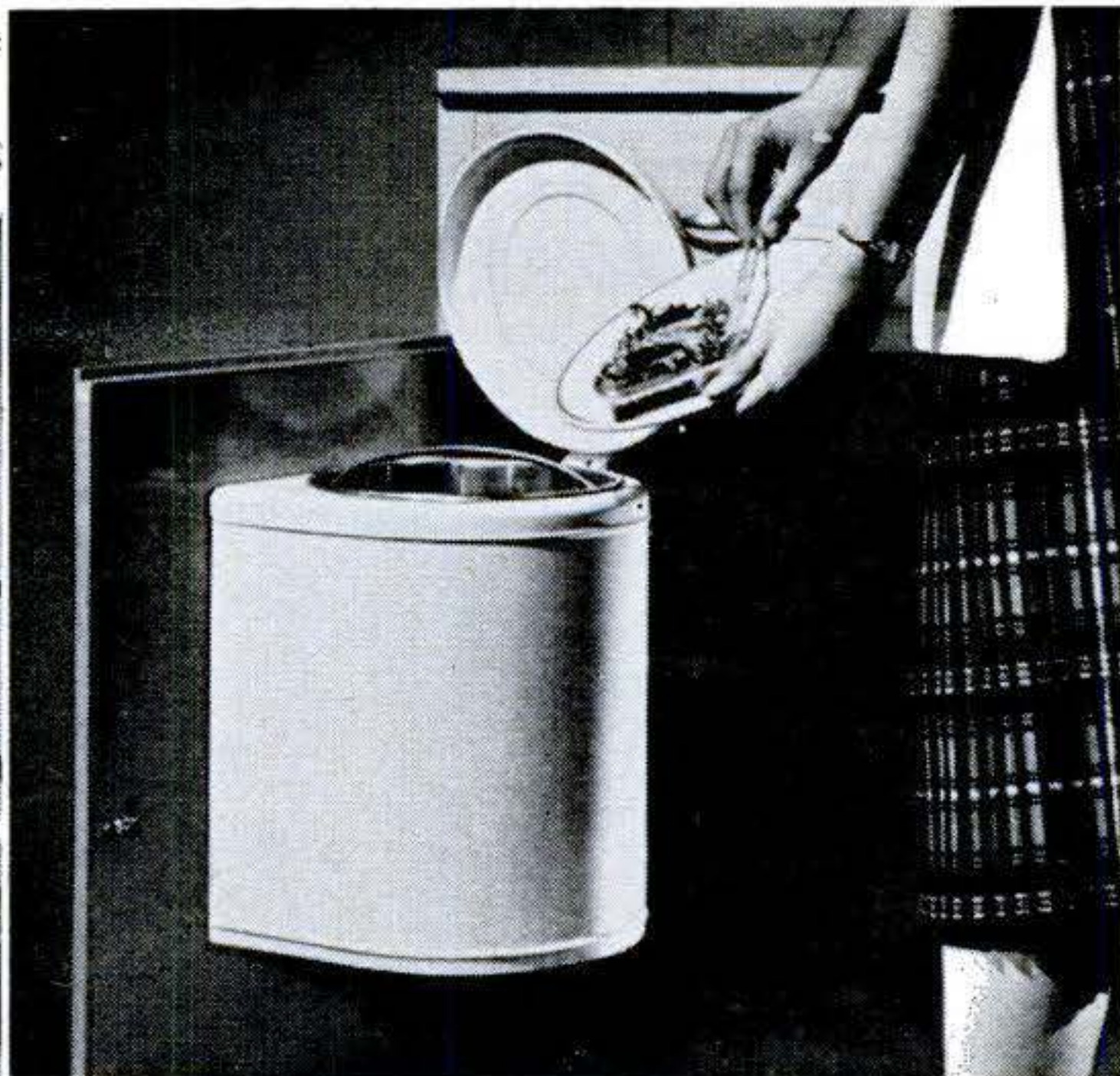


**6. Mixer Lift.** Mounted on a steel framework, this disappearing shelf lifts out the electric mixer and raises it to counter height. Two coil springs counterbalance the weight of the mixer so that the shelf is always level, and a rod locks it in working position. Two sizes are available to fit most cabinets.





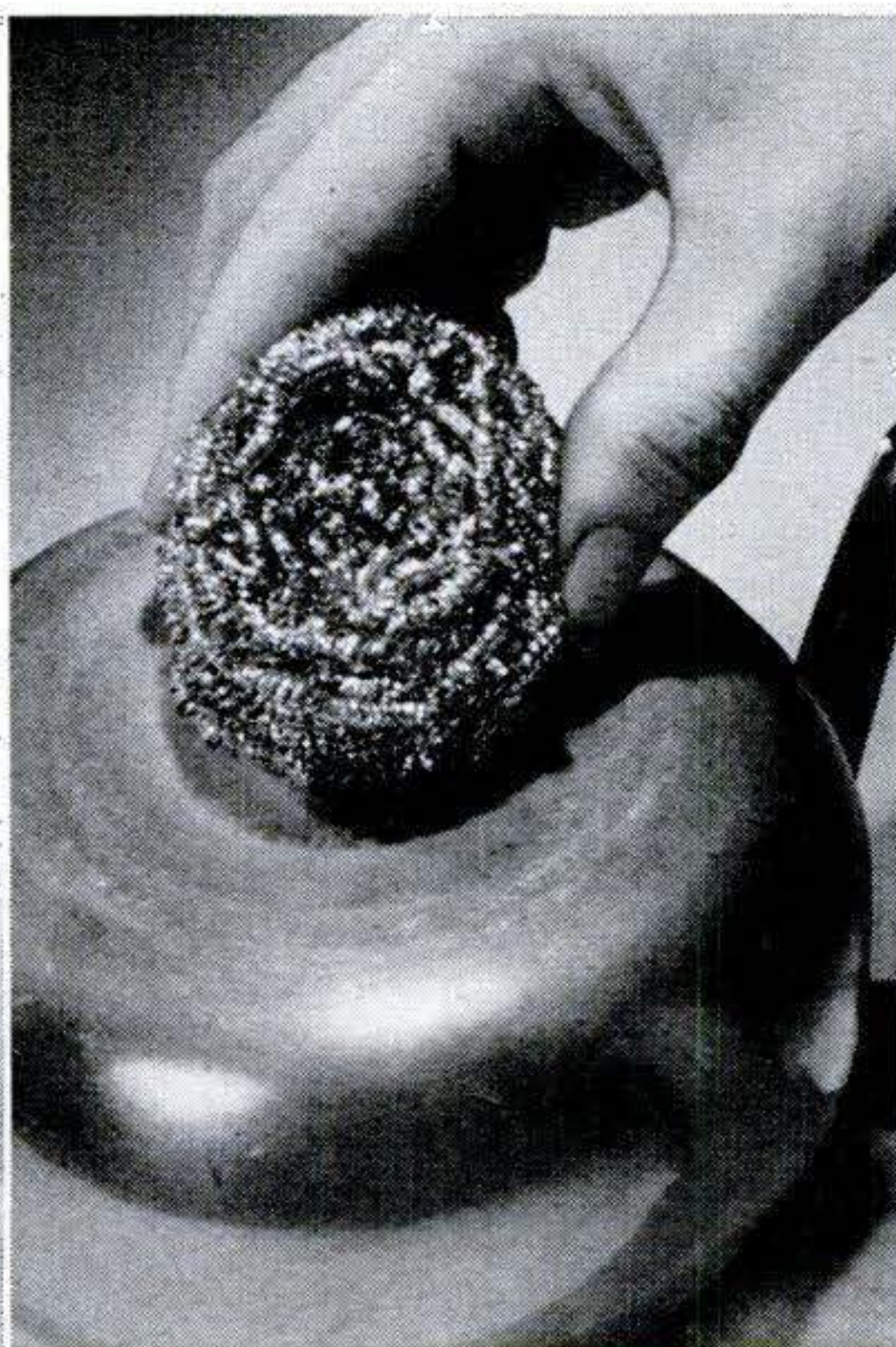
**2. Book Rack.** A cookbook is held at eye level and out of the way of cooking ingredients when it rests on this swing-away rack. Both book and rack tuck away beneath the cabinet when not in use. Set horizontally, the shelf serves as a cake-cooling rack.



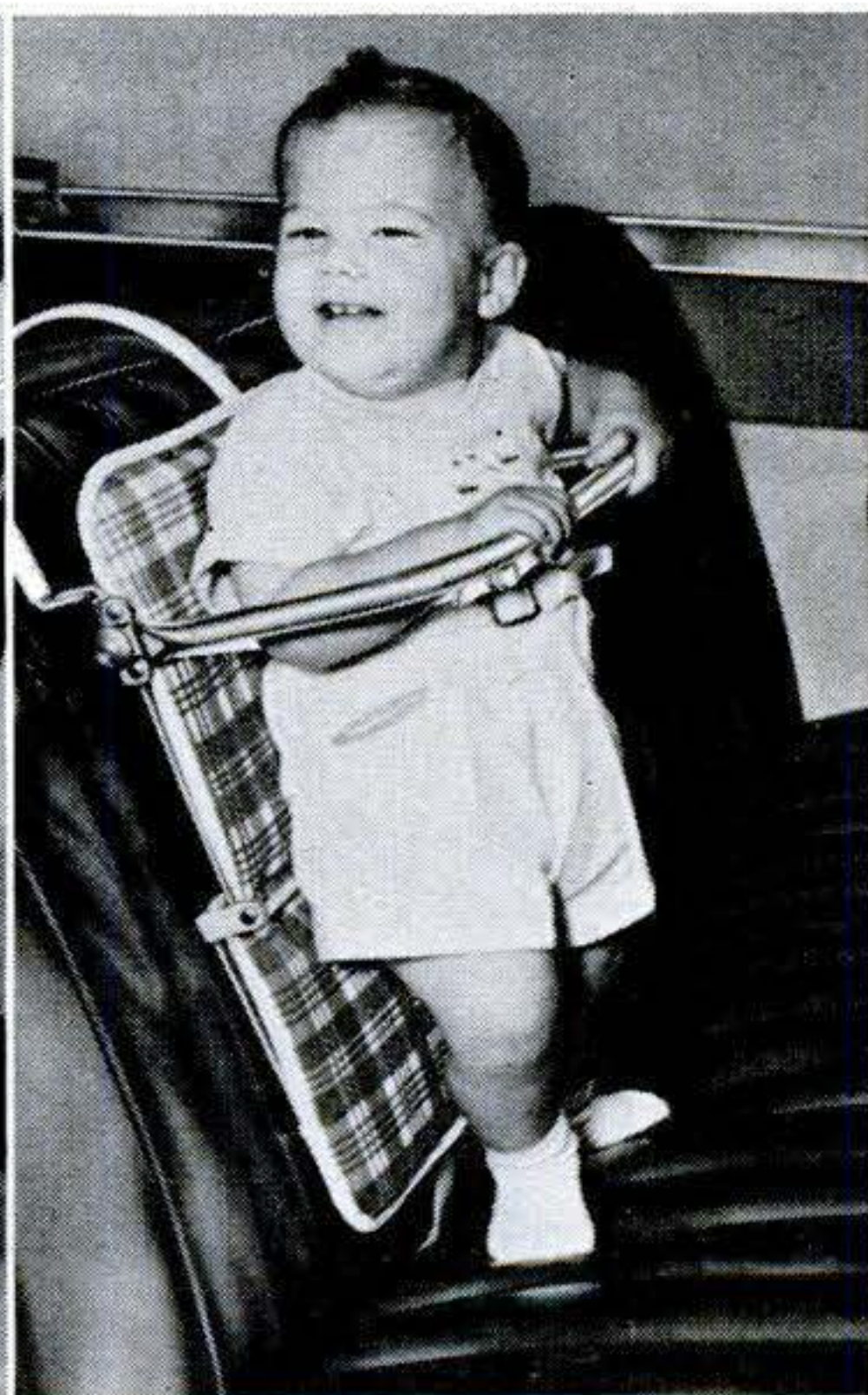
**3. Pop-Up Garbage Can.** The cover of this container automatically opens when the cabinet door is opened, closes when the door is closed. It can be attached to wood or metal cabinets. Models for doors opening at left and at right are made.



**7. Phone Stand.** Even when you're dialing, the two rubber-covered clips on this three-legged table hold a telephone tightly. The Phone Pony's birch top has a plastic finish.



**8. Scouring Pad.** This metal sponge will never rust—its curlicues are stainless steel. Made for cleaning stainless-steel pots, pans, sinks and stove tops, it will do a scouring job on any metal.



**9. Car Pen.** A youngster eager to stand on a car seat can be hemmed in by this guard rail. A harness keeps him from sliding out from under. Half of back pad can be folded up to make a seat.

Further information on these products can be obtained from: 1. Landers, Frary & Clark, New Britain, Conn.; 2. Saker Industries, Harrington Park, N. J.; 3. Leigh Building Products, Coopersville, Mich.; 4. Mercurio Restaurant, 106 W. 52 St., NYC; 5. Squeezit Corp., Morris Heights, N. Y.; 6. McMahan Bros., 2220 S. Hoover St., Los Angeles; 7. G. D. Martin Co., Box 579, Olympia, Wash.; 8. Metal Sponge Sales Corp., 3650 N. 10th St., Philadelphia; 9. Dennis Mitchell Industries, 4424 Paul St., Philadelphia.

**Please turn the page for more aids to modern living.**

## ***MORE*** Aids to Modern Living



**10. Gravy Boat.** Jack Sprat need eat no fat if he pours his gravy from the spout on one side of this ladle. Mrs. Sprat by-passes the lean by pouring from the lip opposite.



**11. Accessible Refrigerator.** The shelves in the new Frigidaire glide out to their full length on nylon rollers, making it easy to reach foods tucked away at the back.



**12. Three-Way Table.** The two shelves of the Tri-Table lock in three different positions to form a two-tiered serving table, a portable bar or tea cart, or a bridge table.

**13. Silver Stickers.** Separate silver pieces can be joined to make other silverware with Stik-Craft sticky plastic disks. At right a tray and candlestick form a compote. Disks hold under water, but can be pulled off.



Further information on these products can be obtained from: 10. Cardinal China Co., High St., Carteret, N. J.; 11. General Motors Corp., Dayton, Ohio; 12. Frederic Arnold Co., 93 Commercial St., Brooklyn; 13. The Gorham Co., 333 Adelaide Ave., Providence.

# Has the Fly Got Us Licked?



***The super flies scorn insecticides to multiply and attack again—but you can help beat them.***

## **By Dixie Leppert**

SOME people in Phoenix, Ariz., are going to find bright red houseflies walking up and down the screen door this summer. Also yellow, green and blue ones. And if the surprised citizens reach for a Geiger counter instead of a swatter, they will find that these flies are radioactive, too—"hot" little numbers colorfully dyed so that they can be tracked. They will be released by public-health men in one of the newest offensives of the age-old war against the fly.

This summer there will be "a worse plague of flies than at any previous period in recent times." So predicts the National Pest Control Association, a highly regarded body of sea-

soned fighters, girding for new campaigns.

Why? Mainly because the battle between the wonder insecticide, DDT, and the housefly has been won by the fly. In many localities we must now contend with super flies—able to withstand not only DDT but also the newer poisons. Even more potent insecticides are being developed, but laboratory evidence suggests that with them, too, the fly will learn to roll with the punch and come back for more.

### ***Swiss Insecticide Wins First Round***

This does not mean that the fly, having so far won its battle against insecticides, will go on to win its war against man. But it is an astonishingly durable enemy. To de-

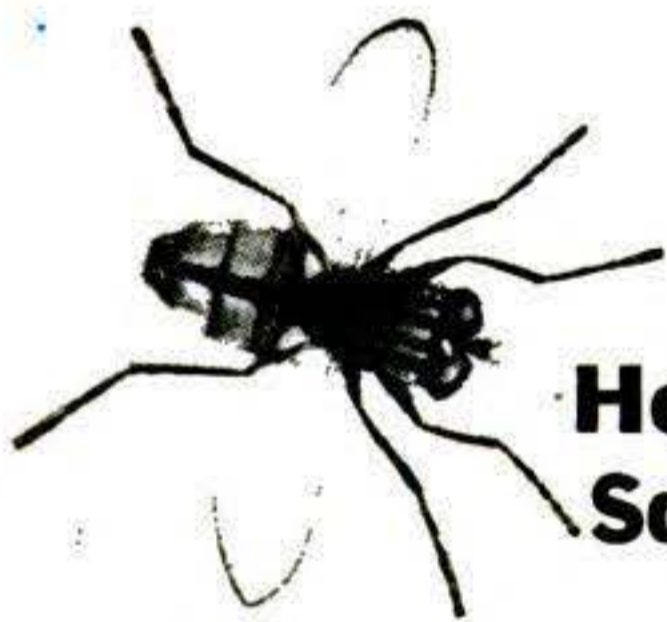
feat it, the entomologists now say, we must learn much more about its physiology and behavior. At the same time we must return to the old-time religion of sanitation.

Nine years ago this spring the Orlando, Fla., laboratory of the Department of Agriculture tried out a new Swiss insecticide in a dairy where the flies were so thick that 15 sweeps with an insect net collected 1,500. Twenty-four hours after the buildings had been treated with the new stuff, the count dropped by 95 percent. A week later the fly population was still only five percent of what it had been. A week later it was still at that level, and a month later, and three months later, and five months later.

### **Highly Touted DDT Loses Its Sock**

Man, this was something—a chemical you could spray on the walls once and it would keep killing flies all season! It was DDT.

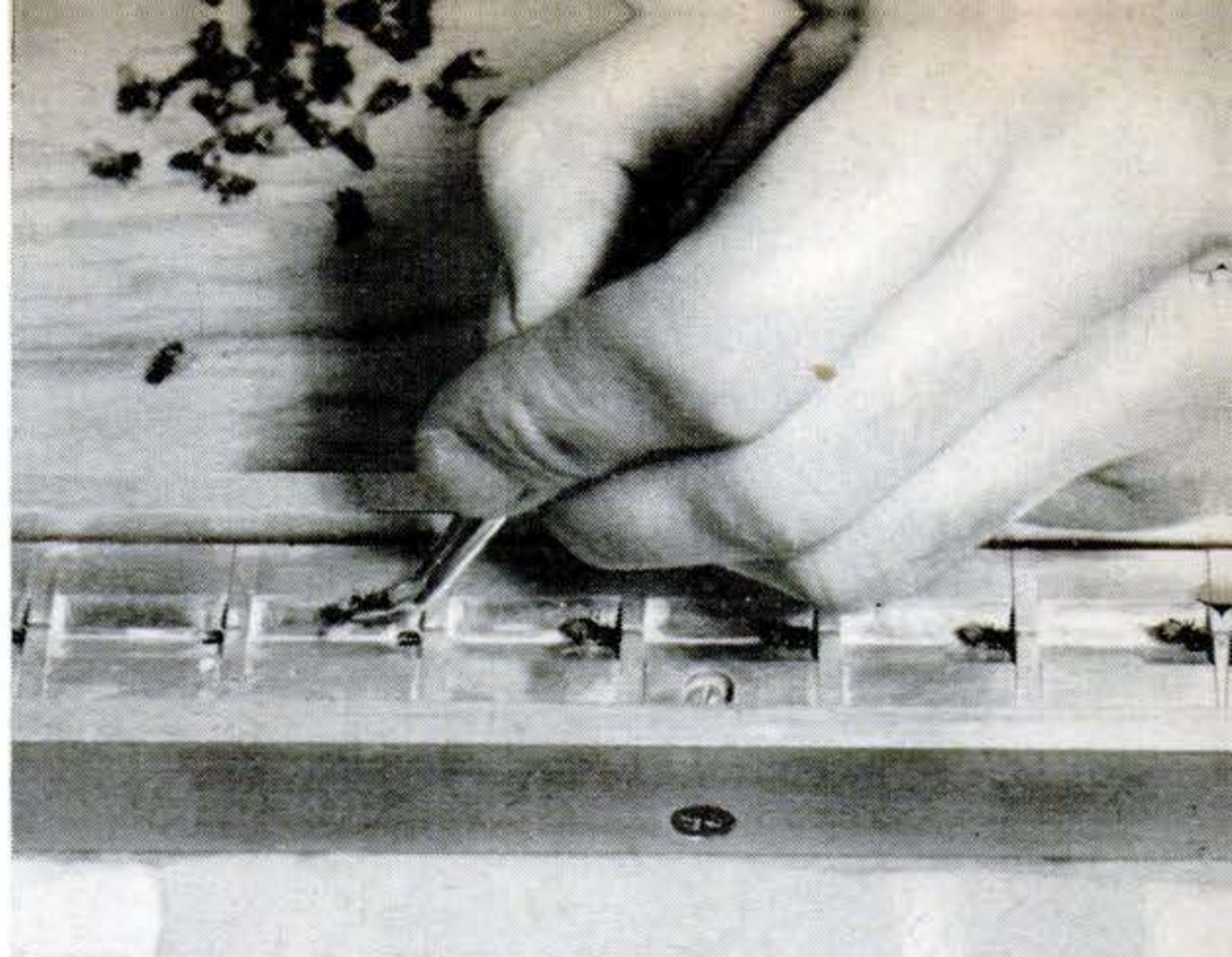
But in 1947 scientists noticed something disturbing at another dairy, near Savannah, one of several places where the Technical Development Branch of the Communicable Disease Center of the U. S. Public Health Service was studying the effects of the new insecticide, which by then was widely used. For two seasons the stuff had just about cleared this dairy of flies, but the third year it was used it left hundreds.



## **How You Can Help Squelch Flies**

HERE is what public-health experts advise to keep flies away from your house.

1. Clean up your place. Don't have anything around that attracts flies. (They're especially fond of thrown-out dishwater, since it offers both moisture and food.) Drain your garbage and wrap it in several thicknesses of paper, because refuse that sticks to the sides of the garbage can and sludge that collects in the bottom will breed thousands of flies a year. Have garbage collected at least twice a week. Otherwise larvae may crawl out of the can and become flies at your back door.



**DOPED FLIES** at Communicable Disease Center are laid on their backs over holes in trough with a nylon thread running through it. After lid is on, trough is turned over and glue is squirted in (above, right), sticking each fly to

A bad batch of DDT? A boom season for flies? Whatever the cause, public-health workers all over the world reported similar results.

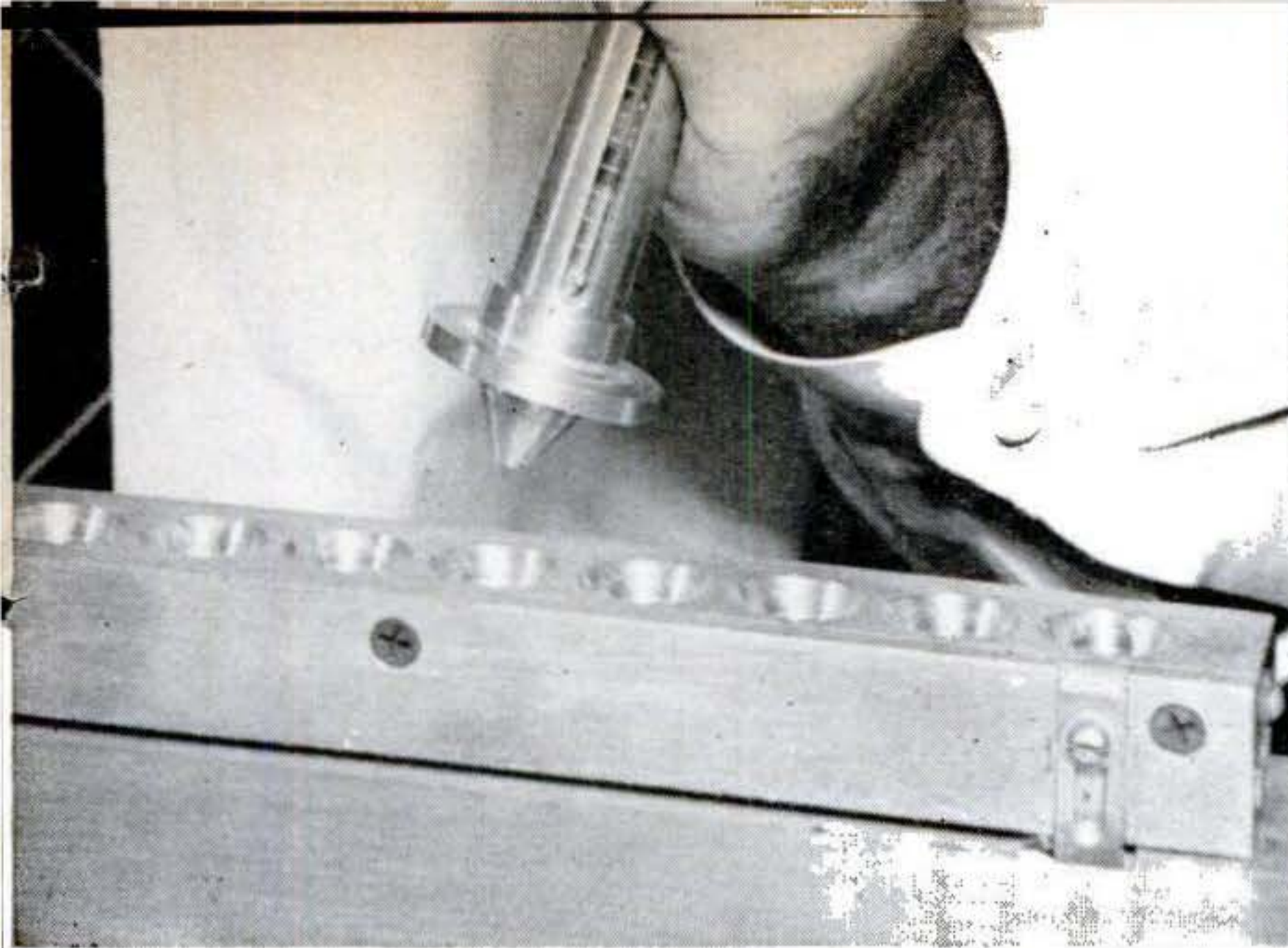
Next year the effect was worse. In spite of a new application of DDT, the flies at this Savannah dairy buzzed as loudly and swarmed as thickly as in the bad old days. They had developed resistance.

The investigators switched to a newer insecticide, chlordan. It worked well for the

2. DDT may still work in your area. (Flies are generally less resistant in the northern states because they haven't been exposed to so much of the stuff.) If it doesn't, you can probably knock down the pests with a space spray or aerosol bomb containing pyrethrum or allethrin. Allethrin is a pyrethrum-like synthetic created by Department of Agriculture researchers at Beltsville, Md.

3. Read the label of any insecticide you buy. If you're dealing with resistant flies and the label doesn't say that the stuff will control flies, it probably won't. Incidentally, that bottle of half-used insecticide that's been hanging around since last fall is probably still good—if your flies haven't grown tougher.

That first point—*clean up*—is easily the most important. It's more troublesome than spraying but it's likely to control flies better.



thread. String is then lifted out and snipped (right). When the flies revive, they buzz off trailing one-inch leashes. These make it easier for the scientists to recapture them—dead or alive—after dousing them with test sprays.

rest of the season, but by the following spring the flies could take that in their stride, too. The scientists then tried dieldrin, a still newer compound. For two months it proved at least as powerful as DDT had been, but after that it fizzled. They next turned to lindane. It had an excellent record but these particular flies weren't fazed even for a day.

Today you can swat these flies and they'll die, and you can hit them with space sprays and kill some of them. But residual killers—the kind you paint or spray on surfaces where insects are likely to rest—have very little effect.

#### *Lazy Flies Are Tougher*

Why does the most spectacular weapon ever used against flies no longer work? Entomologists explain it this way.

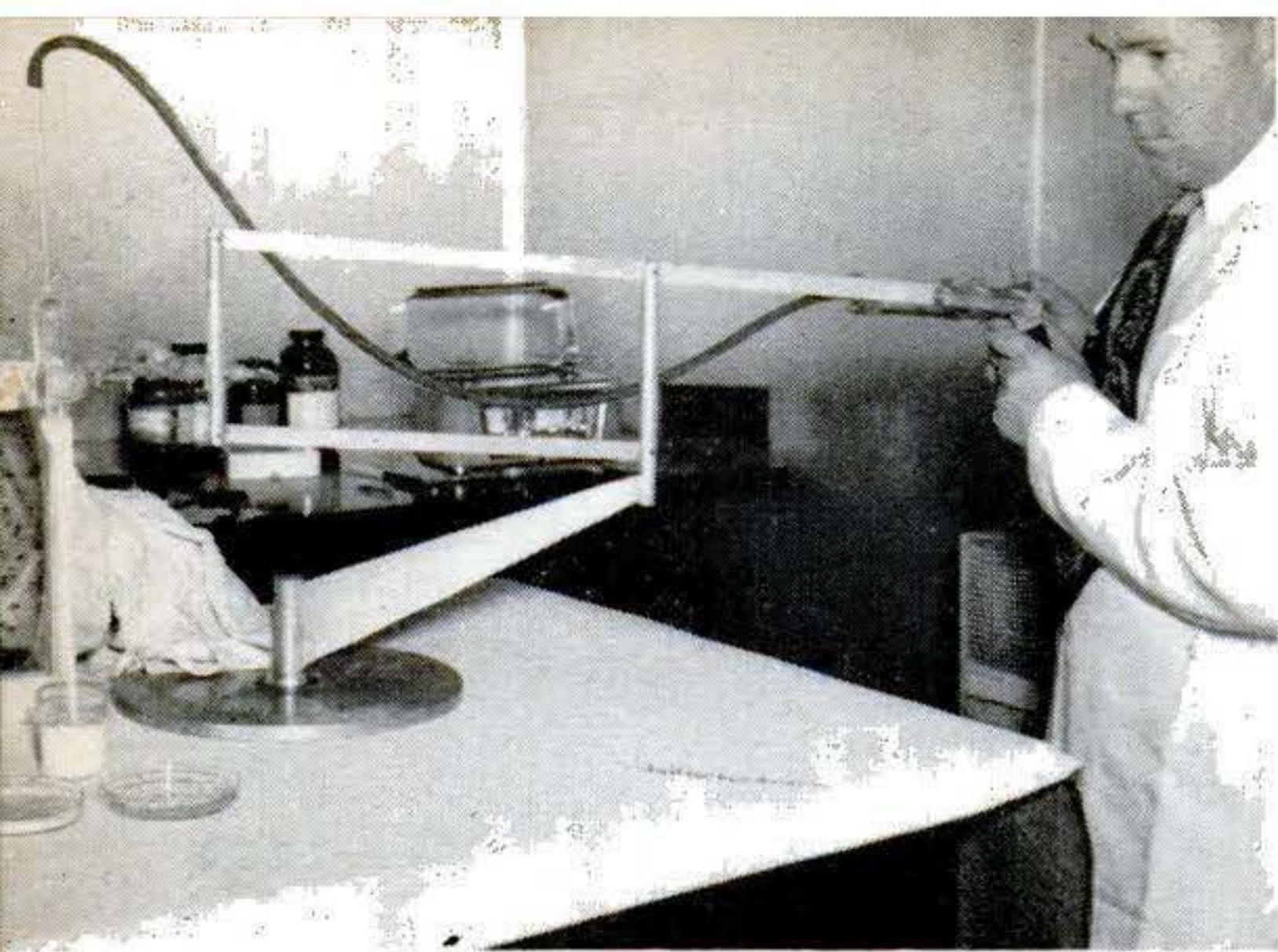
First, some flies are born with thicker pads on their feet, stiffer hair, thicker membranes over their joints, and other characteristics that make it harder for a poison to be absorbed. These physical toughies live through an attack that kills their fellows, and proceed to breed offspring like themselves.

Second, some flies, instead of walking all over a wall, as most flies do, sit still—and absorb less poison. The descendants of these lazy flies tend to do likewise.

Third—and this is a far more common and important type of resistance—some flies absorb as much poison as others but manage to change it to something harmless.

Scientists at several universities have taken resistant flies that recently were exposed to DDT, ground them up, treated the mash with a solvent, and filtered off and analyzed





**"HOT" MILK**, containing a harmless amount of radioactive phosphorus, is poured for some of the 1,500,000 flies raised each month for research at the government's Savannah lab.



**GEIGER COUNTER** spots radioactive flies in a trayful caught eight miles from where the feast of "hot" milk was provided. In this manner, researchers follow the flies' wanderings.

the liquid. Instead of a lot of DDT, they found a lot of something known as DDE. This is a closely related compound but it lacks a molecule of hydrochloric acid and is not poisonous. Apparently, an enzyme in the underskin of the fly had been doing a neat little chemical job.

But the performance of neat little chemical jobs is a game two can play at. Last year scientists at the Public Health Service's Savannah lab began working with a compound called DMC, marketed as Dimite, a killer of plant lice. They soon found that DMC and DDT mixed together would do what neither of them could do separately—kill resistant flies.

### *Sneak Punch Tags Flyweight Champ*

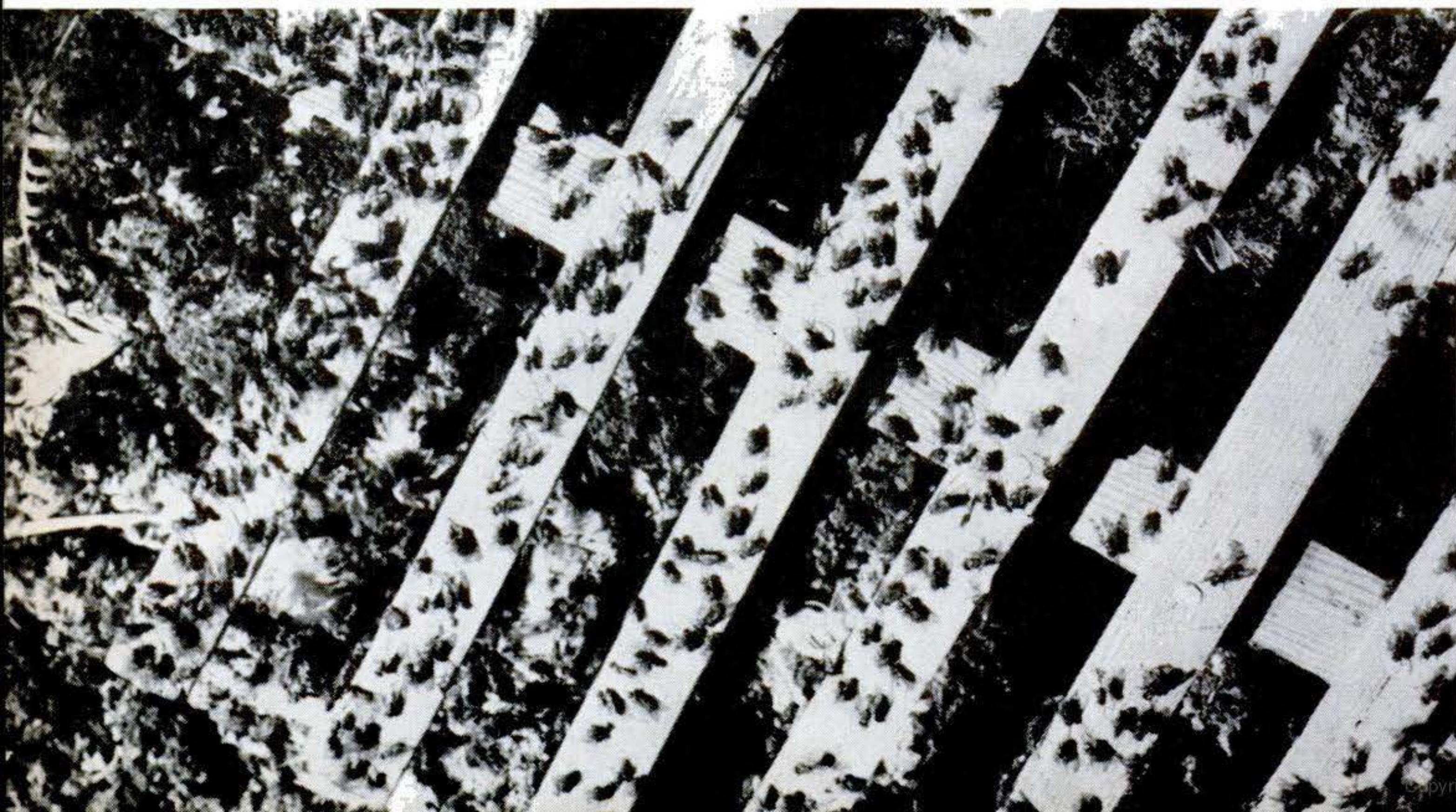
Faced with the DDT-DMC combination, the enzyme that used to break down the killer now goes to work on the killer's harmless partner. It knocks a water molecule off DMC instead of a hydrochloric acid molecule off DDT and so lets the killer slip in his punch.

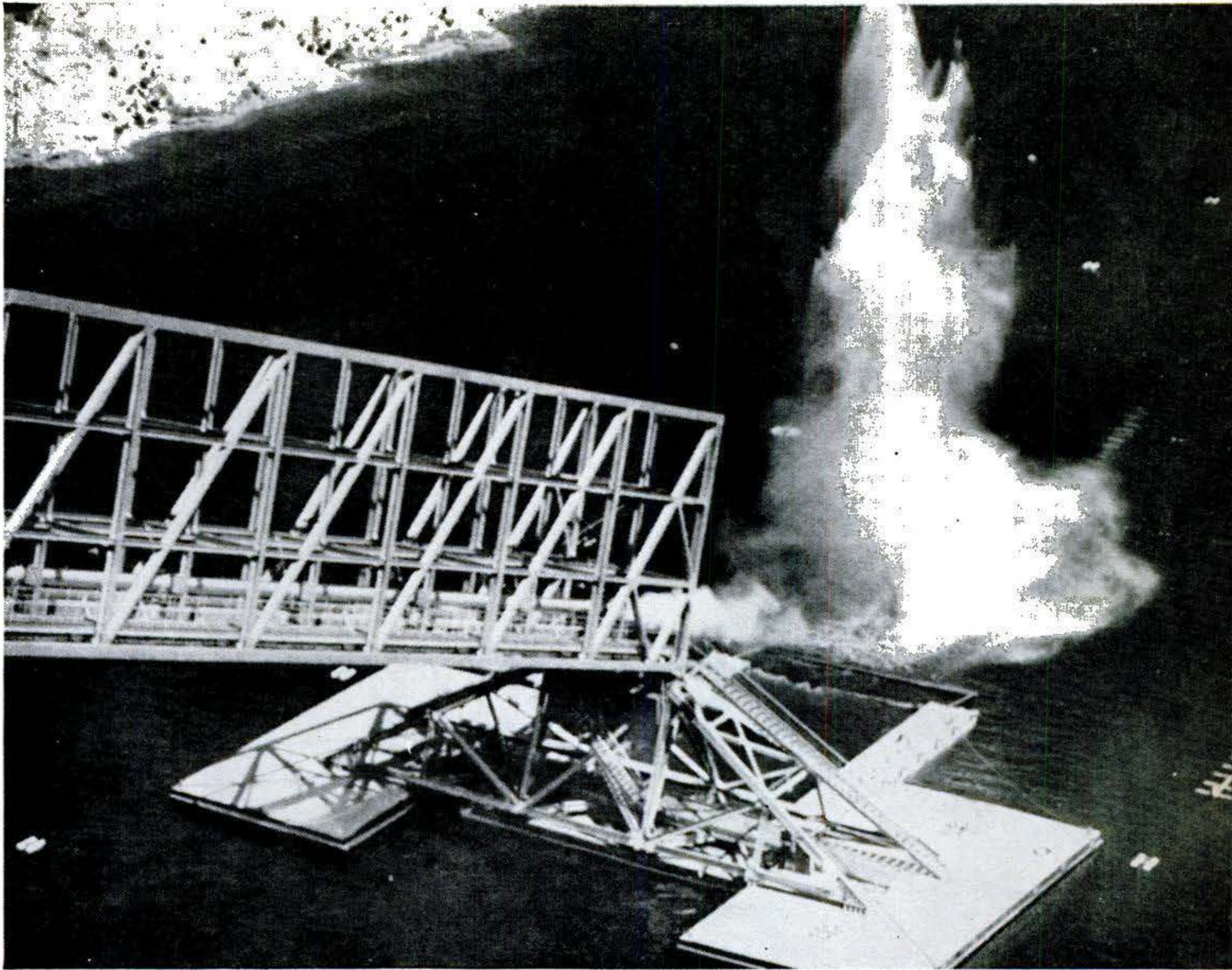
DMC is known as a synergist—a substance that adds power to another substance. It was found after many tests.

But here's the bad news. Used in the laboratory, DDT-plus-DMC looks good as a residual insecticide; used under natural conditions, not so good. Pitted against the toughies at that Savannah dairy, a residual application poohed out fast. However, when the combination was used as a space spray against the same super-flies, it proved just about as good as DDT ever had been.

*[Continued on page 232]*

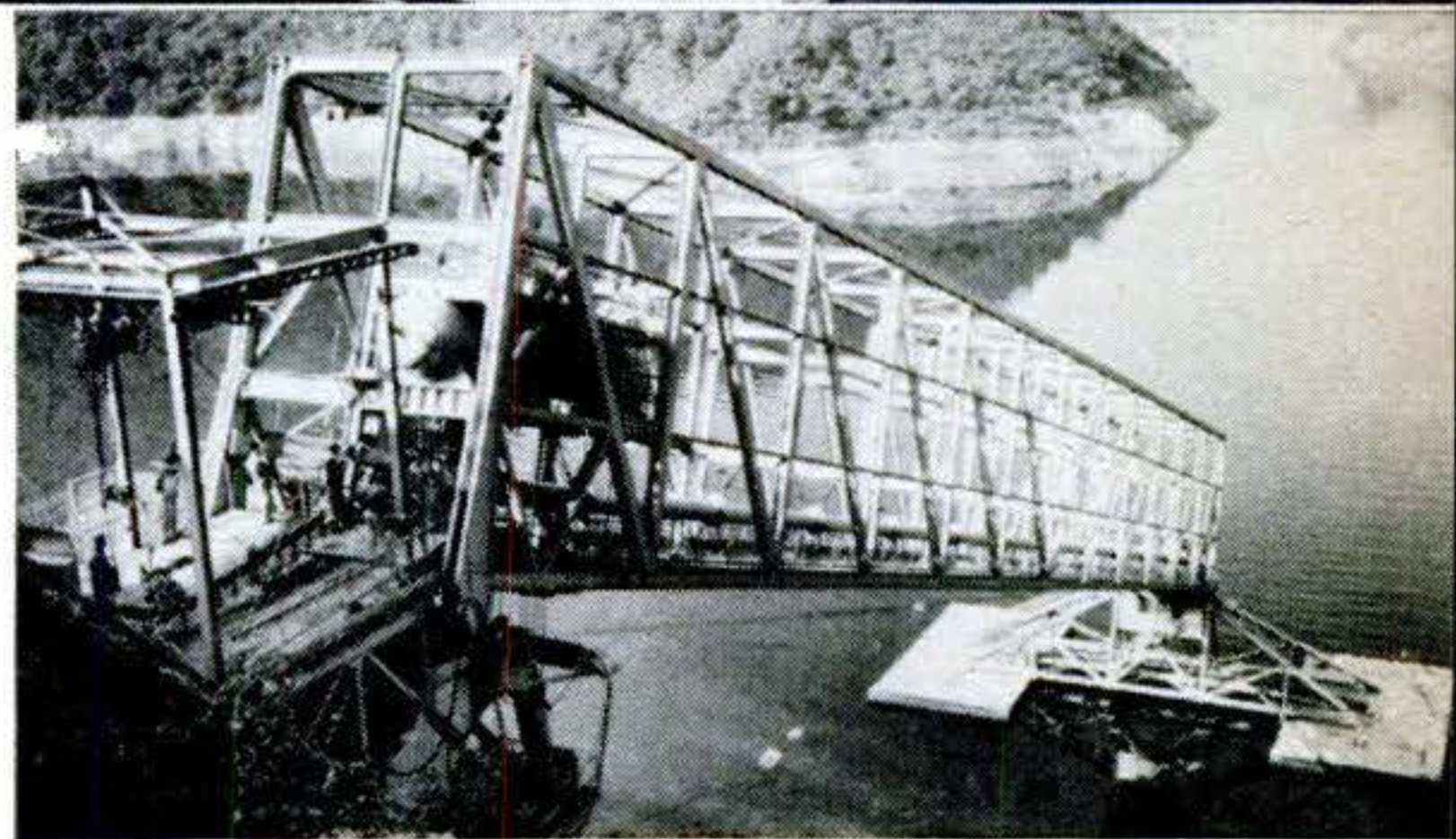
**DDT might once have kept this area almost free of flies for a whole season. It's not so easy now.**





### **Bridge Launches New Torpedoes**

THAT big splash above is an experimental Navy projectile striking a dam-formed lake in California's San Gabriel Mountains. A series of nets measures its velocity. The launching tube runs the full length of the 300-foot-long, welded-steel structure. Photo at right shows the launching platform and the 500-cubic-foot, compressed-air flask that supplies thrust. A hoist raises and lowers the bridge to vary the angle.

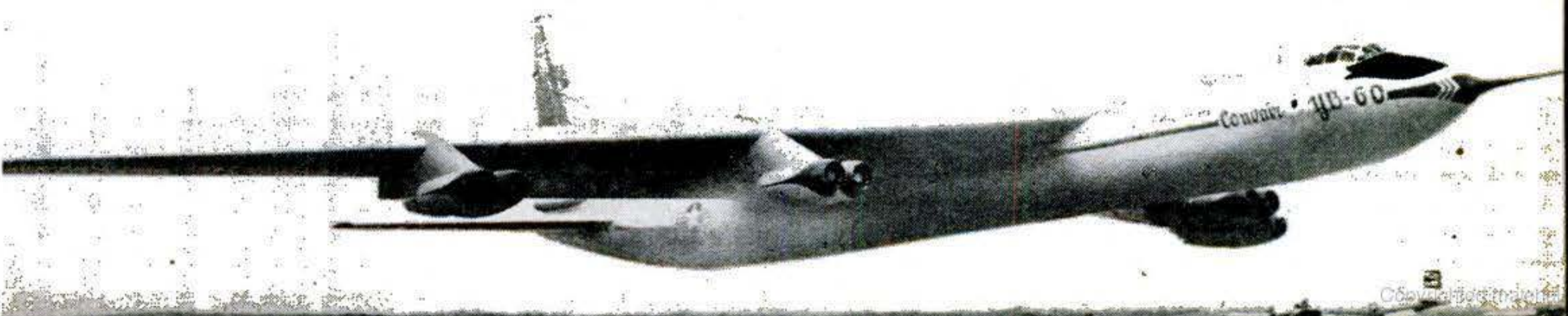


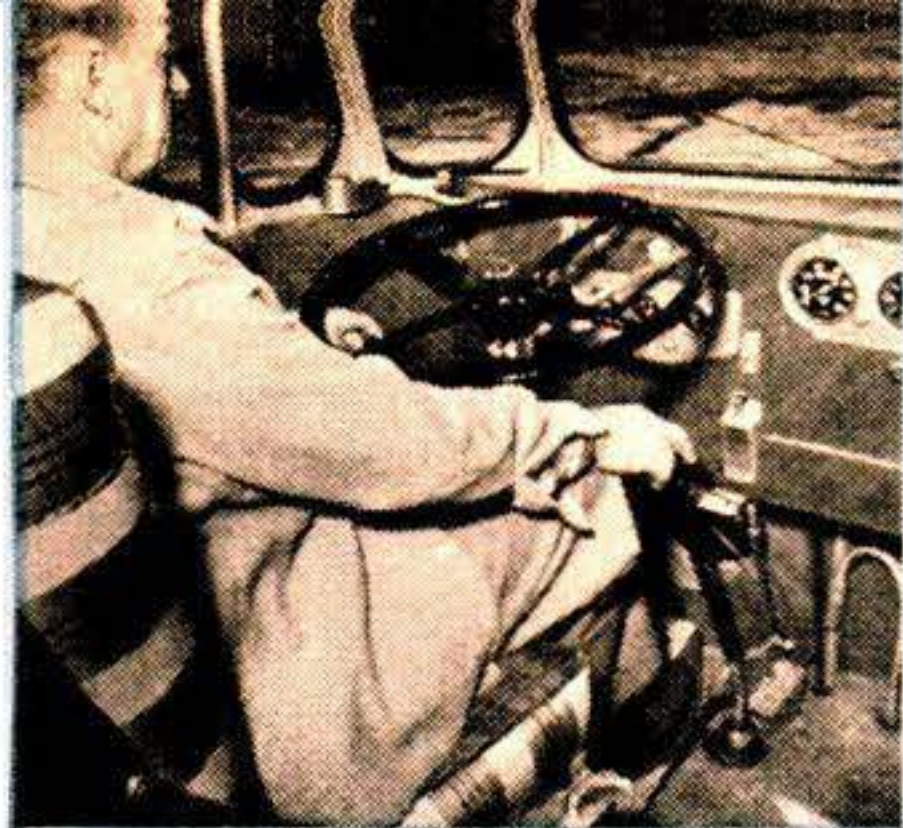
### **Eight-Jet Giant Designed to Carry A-Bomb Anywhere in the World**

A SPEED in excess of 600 miles an hour is expected of the Convair YB-60 Air Force bomber, shown below in its first flight photo. It is an all-jet version of the slower piston-and-jet-powered B-36, and has eight Pratt &

Whitney J-57 engines paired under the wings. With its needle nose and swept-back wings, the YB-60 more closely resembles the recently announced Boeing B-52, also an eight-jet plane, than its parent B-36.

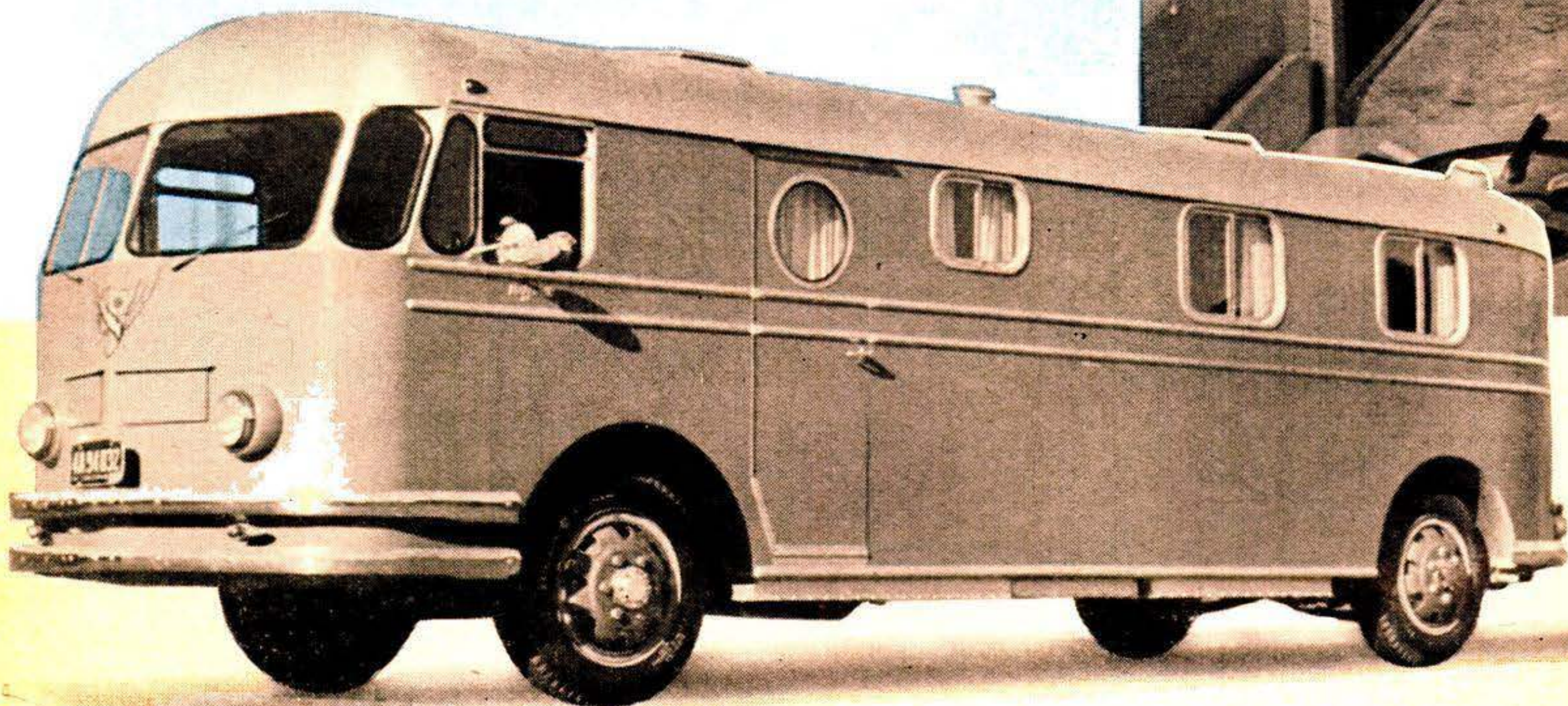
JUNE 1952 117





**California manufacturer has worked airplane ideas into a fancy \$28,000 home on wheels for week-end jaunts.**

# He Drives His House to the Country

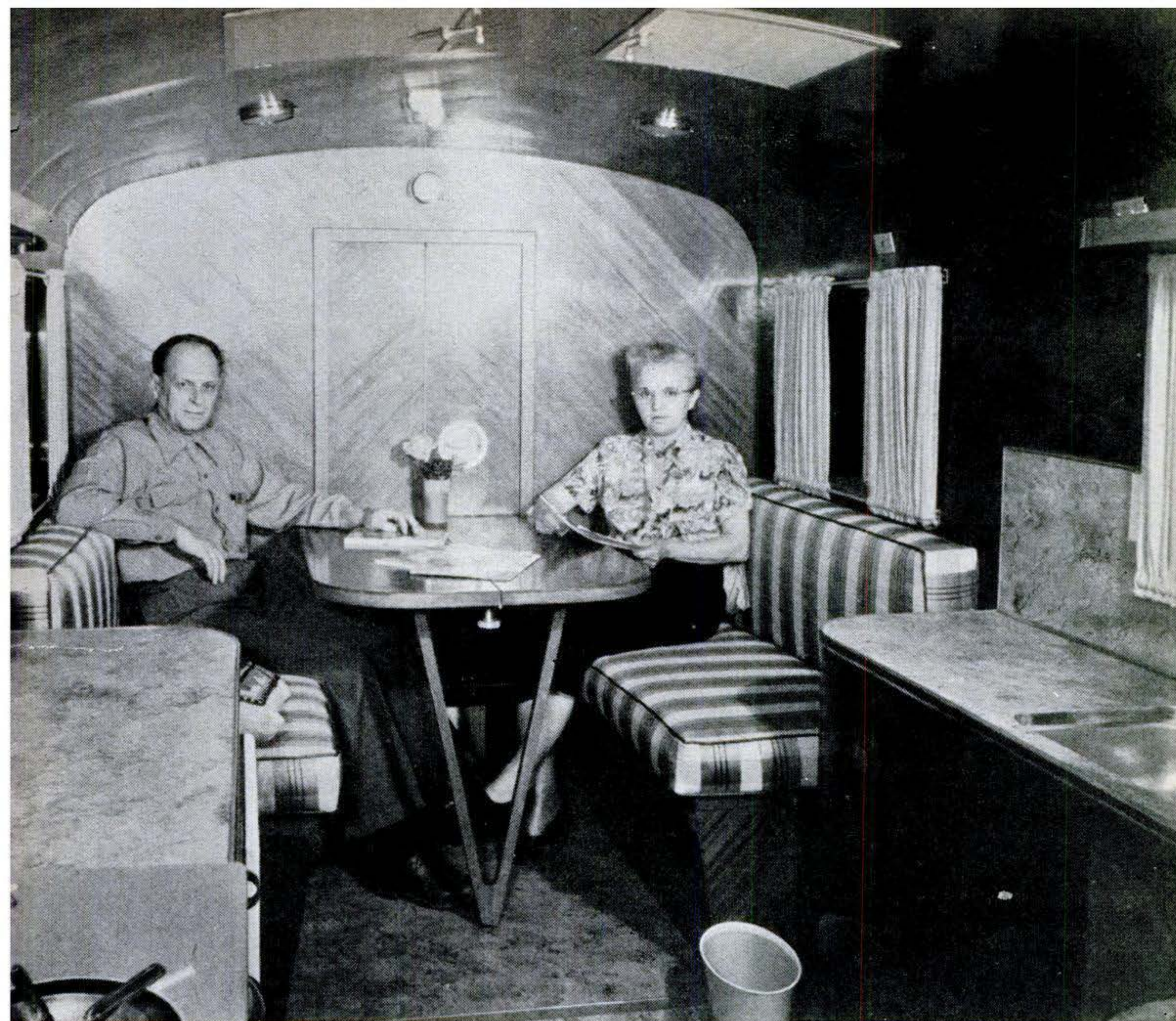


**O** TTO TIMM likes to explore mountains and deserts on his week ends. But all the comforts of home are rarely found in either locality, so he put them on wheels.

The result is this 28-foot-long self-propelled house, complete with hot-and-cold shower, three-burner stove, sink, refrigerator, toilet, clothes closet and foam-rubber beds. A Van Nuys, Calif., manufacturer, Timm spent \$28,000 building it—a cool \$1,000 per foot. He and his wife christened it “Ruffinit,” a deceptively modest name for the de luxe vehicle.

Timm, who built Navy training planes during the war, used his aviation experience in designing the touring coach. Twenty-eight laminated-spruce ribs circle the body. Laminated stringers on 10-inch centers run the length of it. Over this skeleton is a skin of aircraft mahogany plywood covered with plastic, creating a stressed-skin structure of tremendous strength, like an airplane. Another aircraft touch is the hydraulic lines that connect the driving controls up front with the engine in back, eliminating long mechanical linkages.





**AFTER SUPPER**, the Timms relax at table that stows away in engine room behind it. Mahog-

any plywood, with two inches of glass-wool insulation underneath, is the interior trim.

**READY FOR BED**, Mrs. Timm has lowered the backs of the two front seats and fitted jump-seat cushions between them. Plastic-covered, foam-rubber cushions are five inches thick.

**CLOTHES CLOSET**, just aft of front seats, holds 12 suits and dresses, has a hat shelf. Opening its door, which mounts a full-length mirror, separates front of cabin from rear.



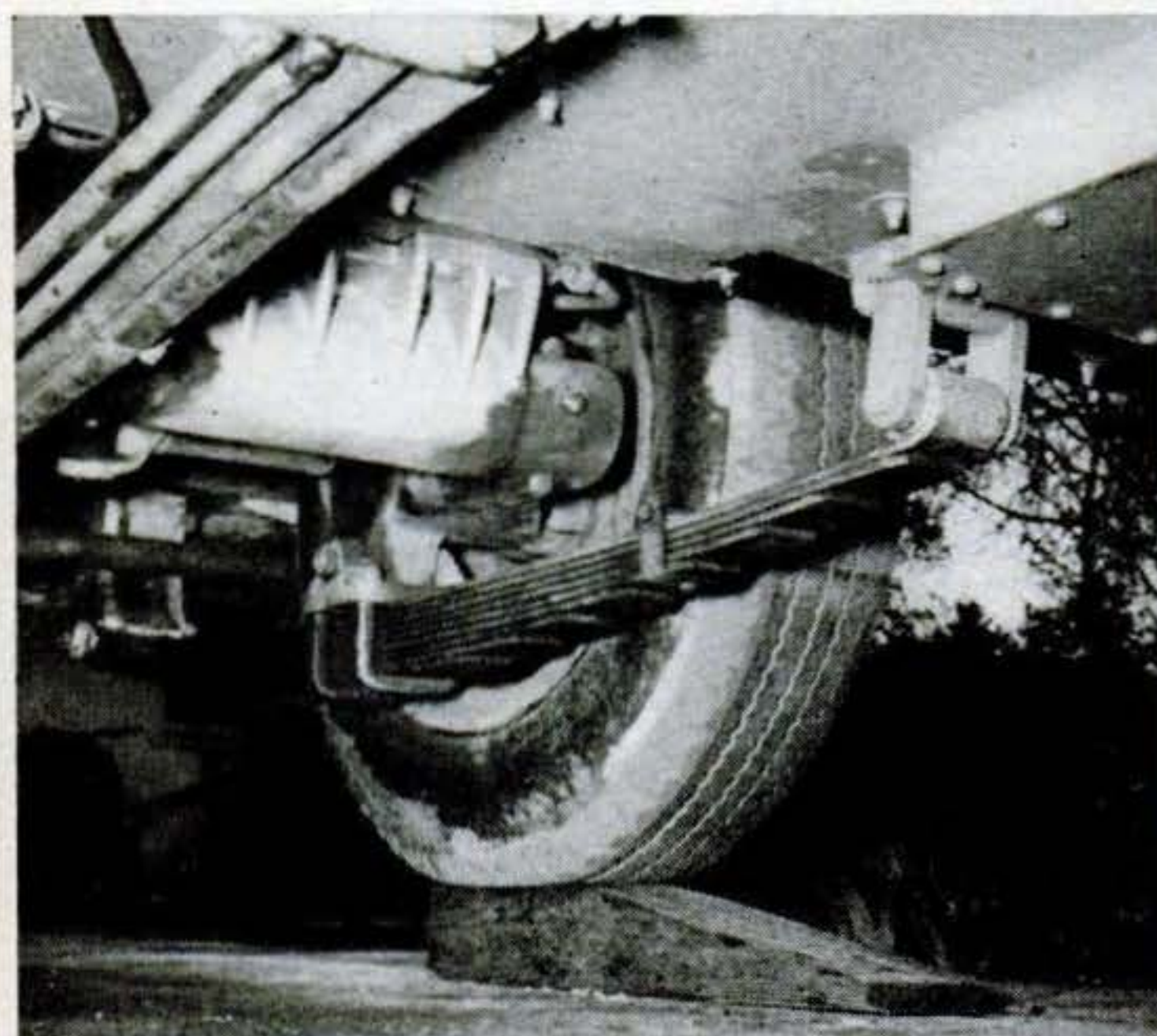
**Please turn the page for more touring-coach photos.**



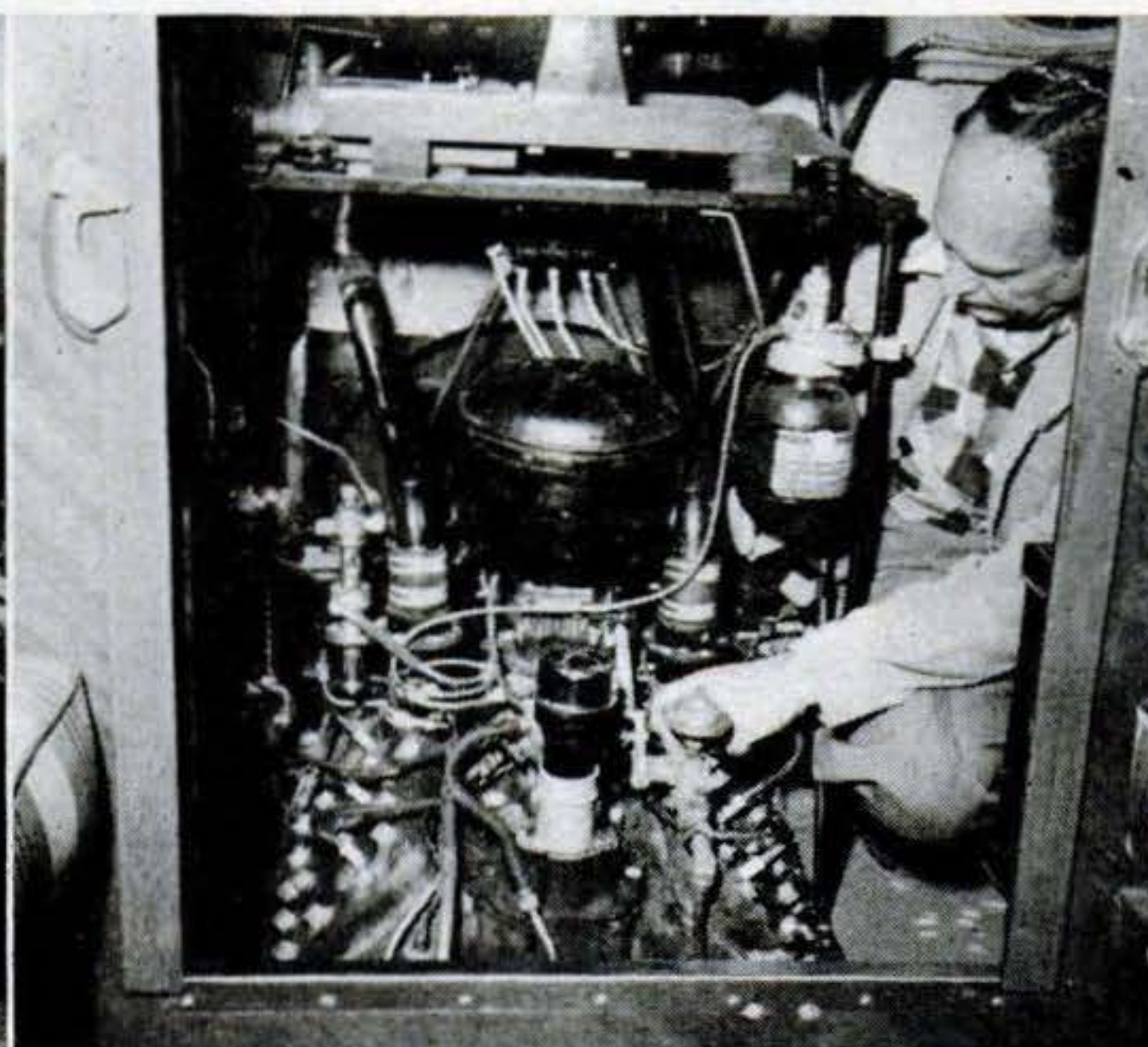
**COOKING WITH GAS.** Mrs. Timm doesn't mind taking along a stove on a holiday because it is an efficient three-burner butane range, complete with oven. A fire extinguisher is near.



**ROUND PLASTIC WINDOWS** in rear help ventilate cabin. Ford bus radiator is in center. Side louvers force air through engine compartment while coach cruises, often at 60 m.p.h.



**TRUCK-TYPE WHEELS** take 7.50-by-20 tires, are independently mounted. Semi-elliptic nine-leaf springs, 48 inches long and 2½ inches wide, handle the load in the rear.

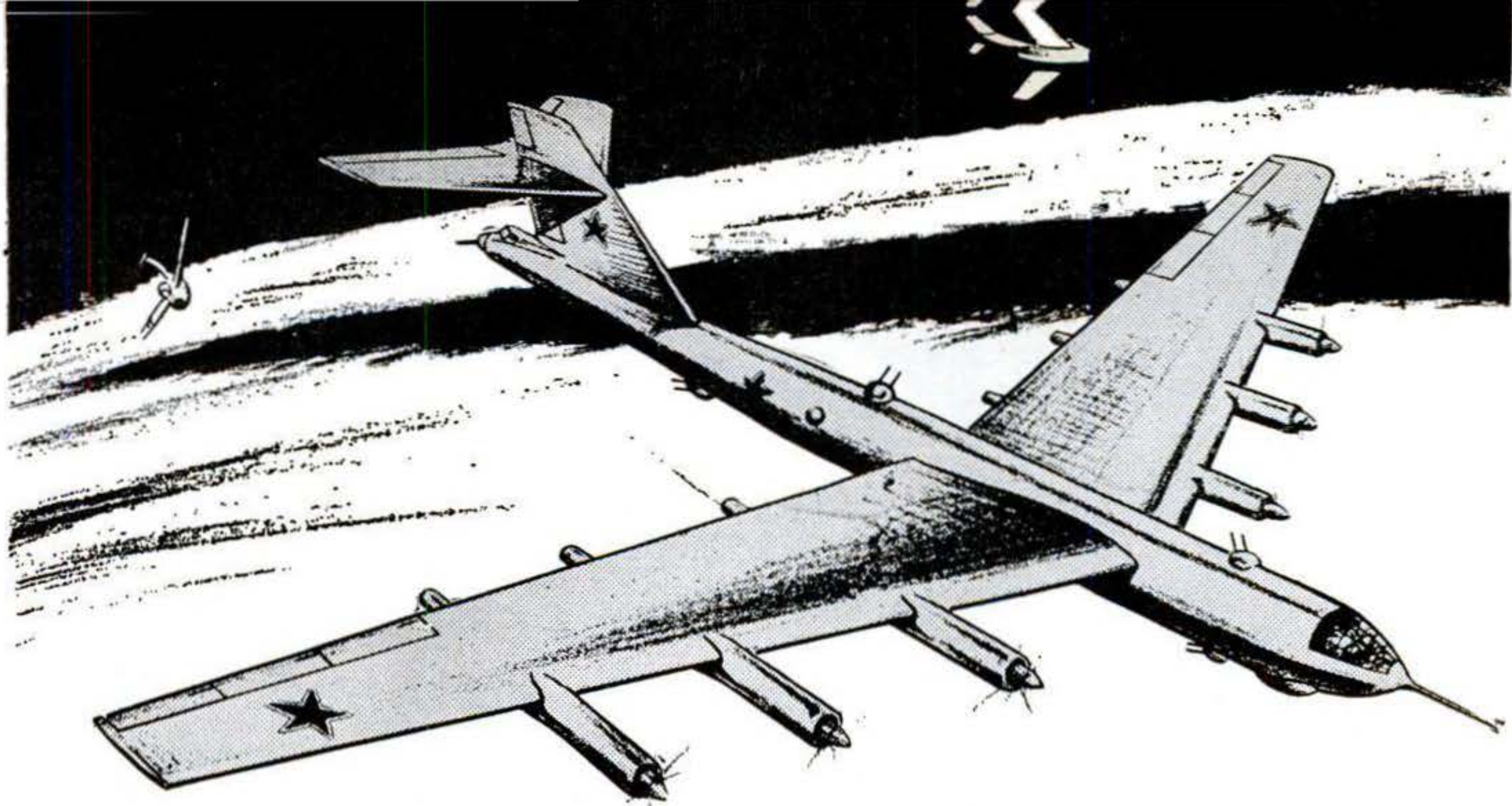


**IN ENGINE ROOM,** Timm makes adjustments on the Ford V-8 truck engine. Room also contains radiator, 2,000-watt motor-generator, battery, refrigeration unit, and butane tank.



**ON LAZY AFTERNOONS,** the Timms set up awning on telescoping aluminum poles and enjoy

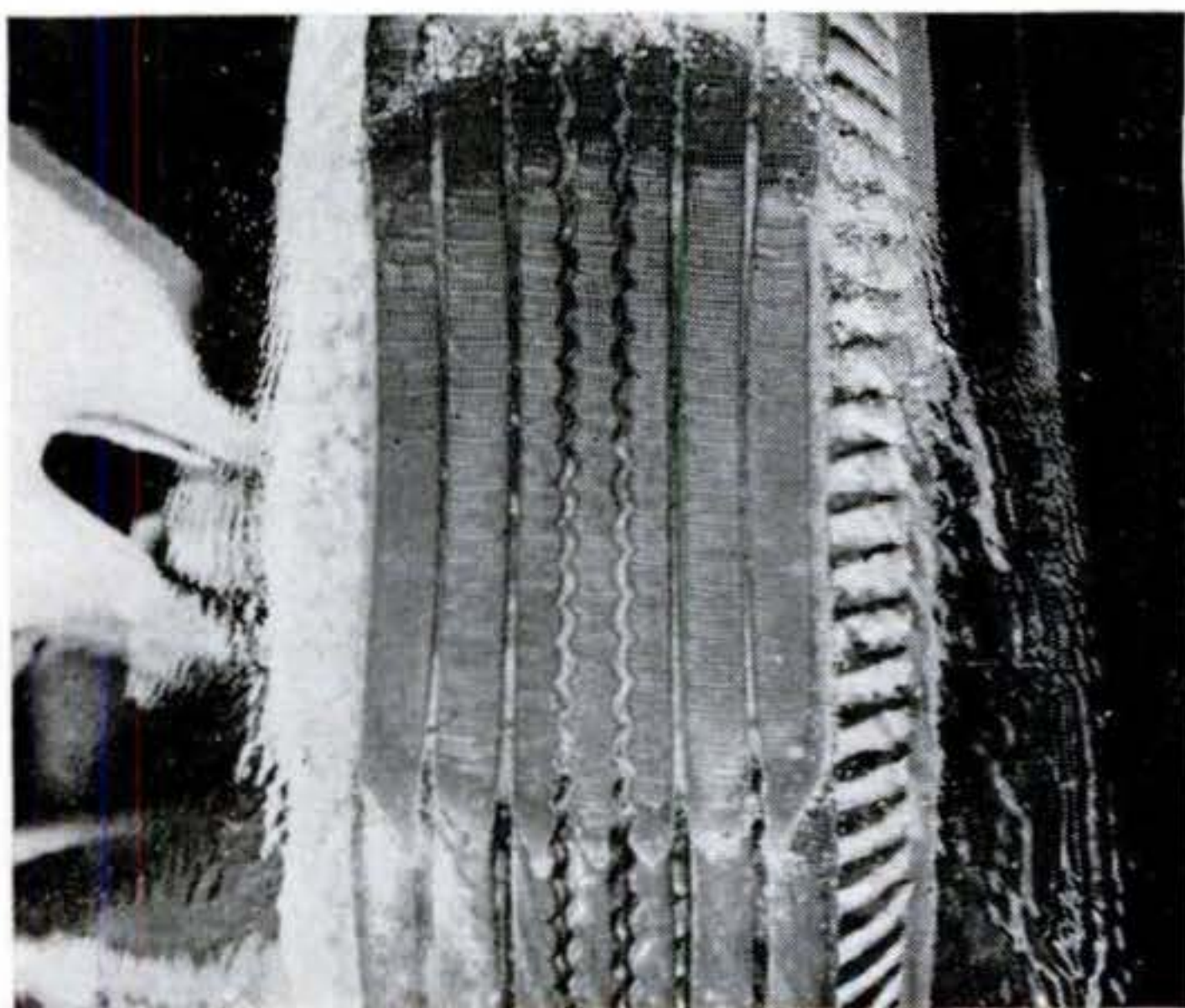
a shady porch. Slide fasteners attach awning to coach roof; gear is stored in clothes closet.



### Artist Portrays What Russia's A-Bomb Plane May Look Like

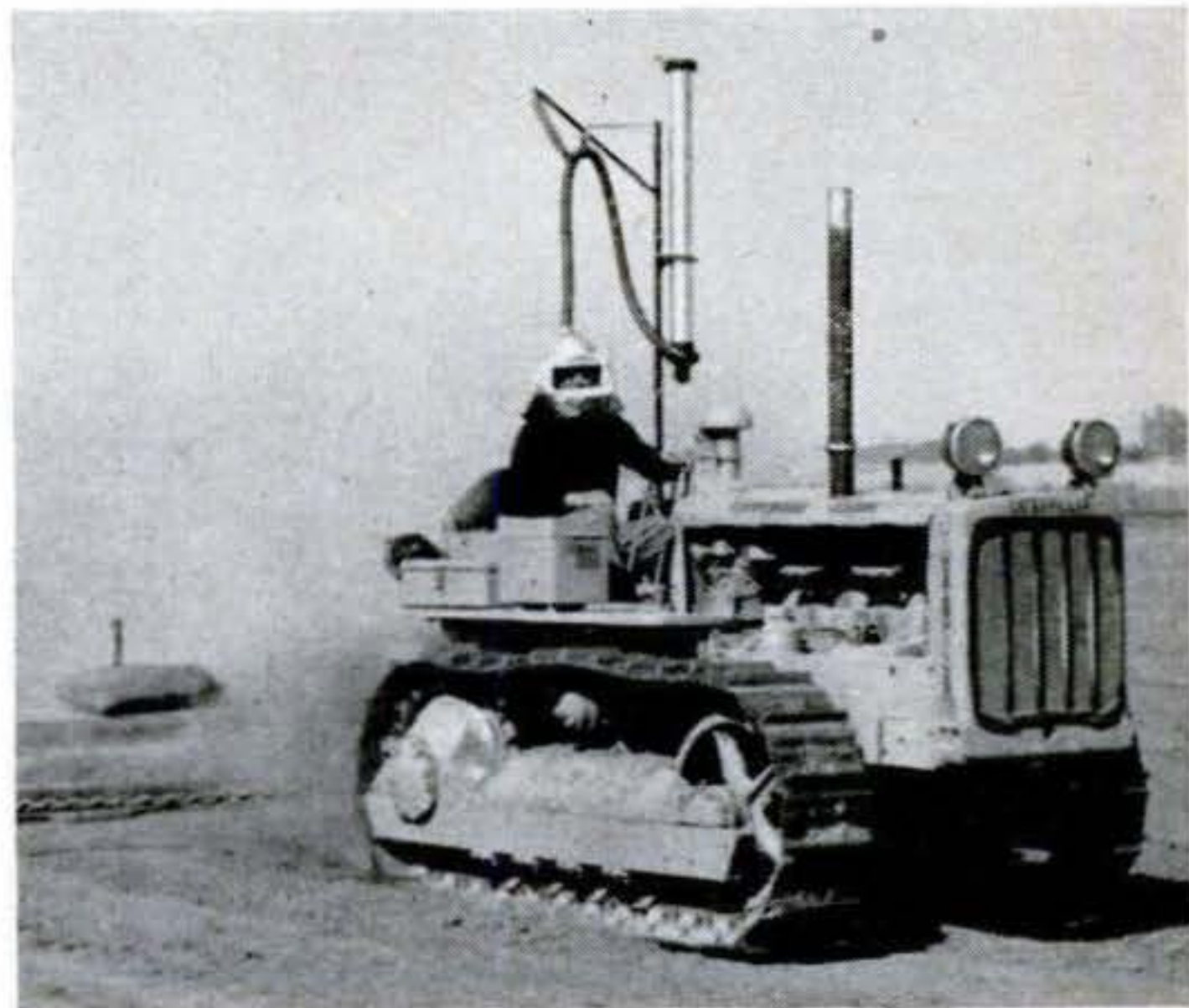
HERE may be the plane Russia would use to deliver its version of the A-bomb. The sketch above is reported to show a Soviet intercontinental bomber whose prototype was test-flown last September. Made public by the Boeing Airplane Co., the picture is based on data brought from behind the Iron Curtain by a technician who is said to have worked on the craft. Comparing in size

with our B-36, the new bomber is described as being manned by a crew of 22 in two "watches"; armed with five gun turrets; and propelled by six turboprop engines on a wing of 223-foot span. If this superbomber really exists, U.S. experts say, it probably can cruise at 450 m.p.h. and drop bombs from 50,000-foot altitude. And, they add, the Russians "have come uncomfortably far."



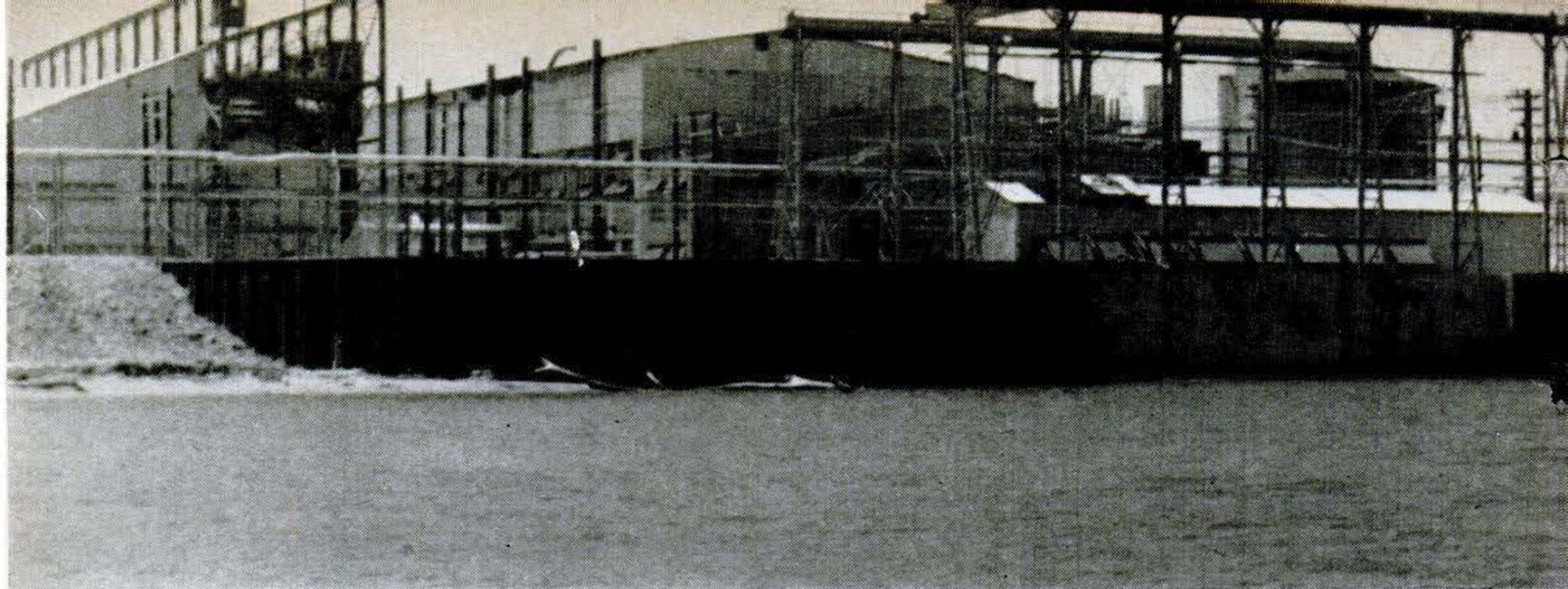
### Blocks in Tire Reduce Skids

A NEW self-sealing tubeless tire with a tread made up of more than 10,000 minute blocks of rubber is said to defy skidding. The blocks act as tiny fingers to grip a slippery surface when a car stops suddenly. Photo through glass (above) shows how blocks in tread open when brakes are applied. B. F. Goodrich Co., the maker, says the tire can stop a car on wet pavement 20 percent faster than regular tires.



### Breather Tube Eliminates Dust

THE tractor-mounted snorkel above enables the operator to breathe clean air while doing a job that fills the air with dust. The upright tube sucks in dust-laden air by means of a small electric motor. A filter cleans it, and sends dust-free air through a flexible tube to a special helmet. The worker may even smoke inside his helmet, says the maker of Dustmaster, the D. H. Loosli Co., Idaho Falls, Idaho.



# Water and Rock Make Better Planes

***From them comes magnesium, our lightest metal. Aircraft makers now gobble the stuff once used mainly for fire bombs.***

**M**AGNESIUM is mighty handy to treat a bellyache, burn a city or make a stepladder the little woman can move by herself. But the boom that has relit furnaces in long-shuttered mag mills from Connecticut to California is for other uses—making missiles, radar, mortar bases, ordnance parts. Most of all, it's for the plane makers, who are gobbling 60 percent of our magnesium.

With Uncle Sam's seven stand-by magnesium plants back at work, 1952 production is soaring to near the 100,000-ton level. That's two-and-a-half times last year's output, and nearly 20 times the postwar low. It reflects the fact that magnesium is not only the lightest industrial metal, but one of the easiest to machine. It is easier to shape in heavy presses than aluminum.

### ***Dampens Vibrations***

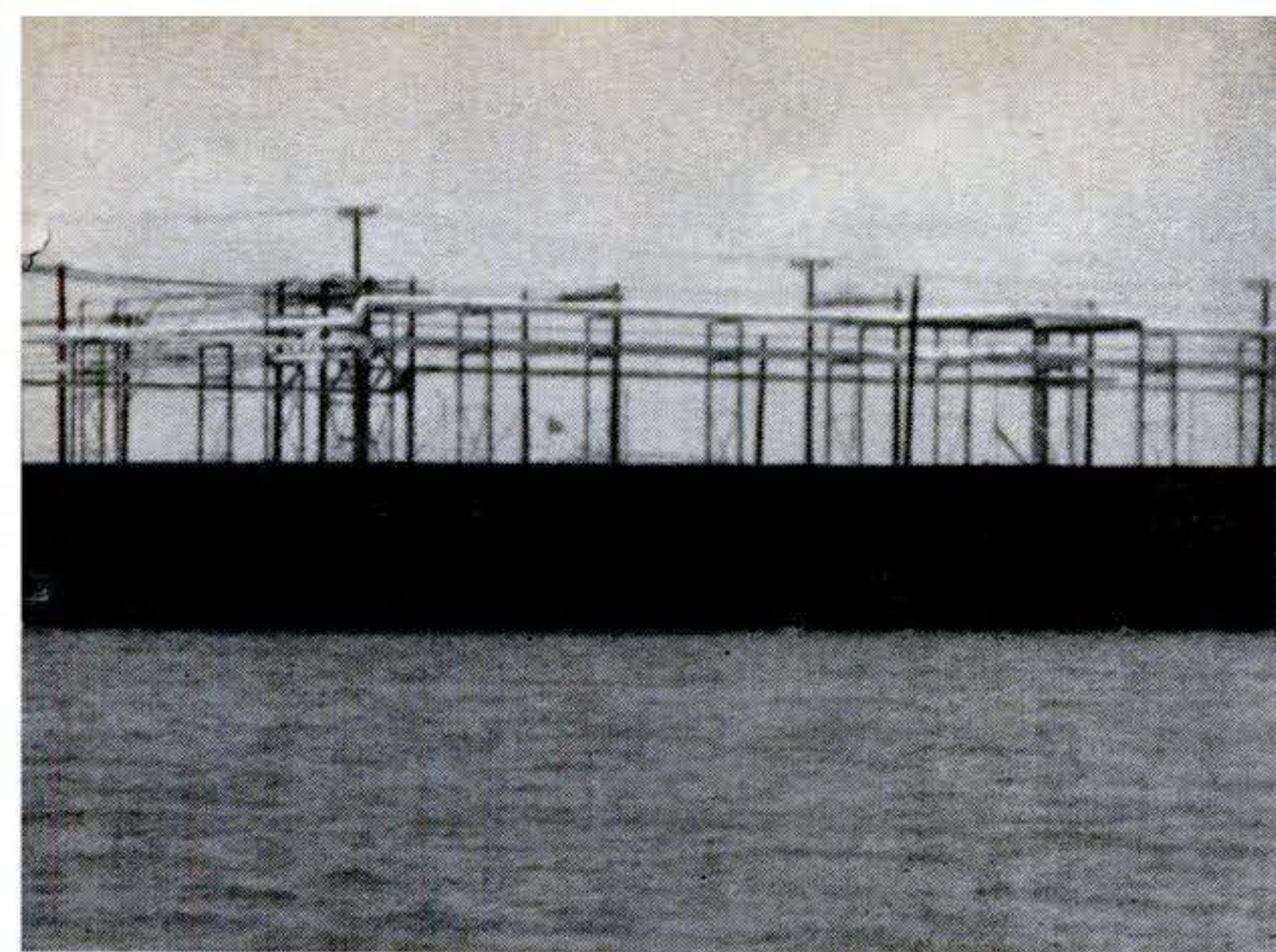
Mag is a stiffer sheet material per unit of weight than either aluminum or steel. It dampens vibrations. While it costs about 25 percent more a pound than aluminum, it is light enough to be used in large castings, replacing expensive assemblies. And it is the

most common of all commercial metals, in recoverable form.

When 10,000 pounds of magnesium parts were substituted for aluminum in the B-36, they saved 4,000 pounds dead weight. Now 30,000 pounds of it go into the latest models of the big bomber. Northrop uses magnesium in more than 300 places in the F-89 Scorpion. The Navy has high hopes for an F9F it has built with an all-mag wing. And new fabricating tools are about to extend usefulness of the white metal.

A little less than half our magnesium comes from dolomite, a common form of limestone. The rest is made from something even more plentiful—ordinary sea water. The water is treated with lime to produce magnesium hydroxide. Converted to magnesium chloride, this is pumped to electrolytic cells, which liberate the pure magnesium.

Dow estimates there's enough magnesium in the sea to coat the entire land area of the earth with a nice eight-foot layer. They are not taking any orders on this project, but the mag boys say there are plenty of other jobs waiting—after defense.

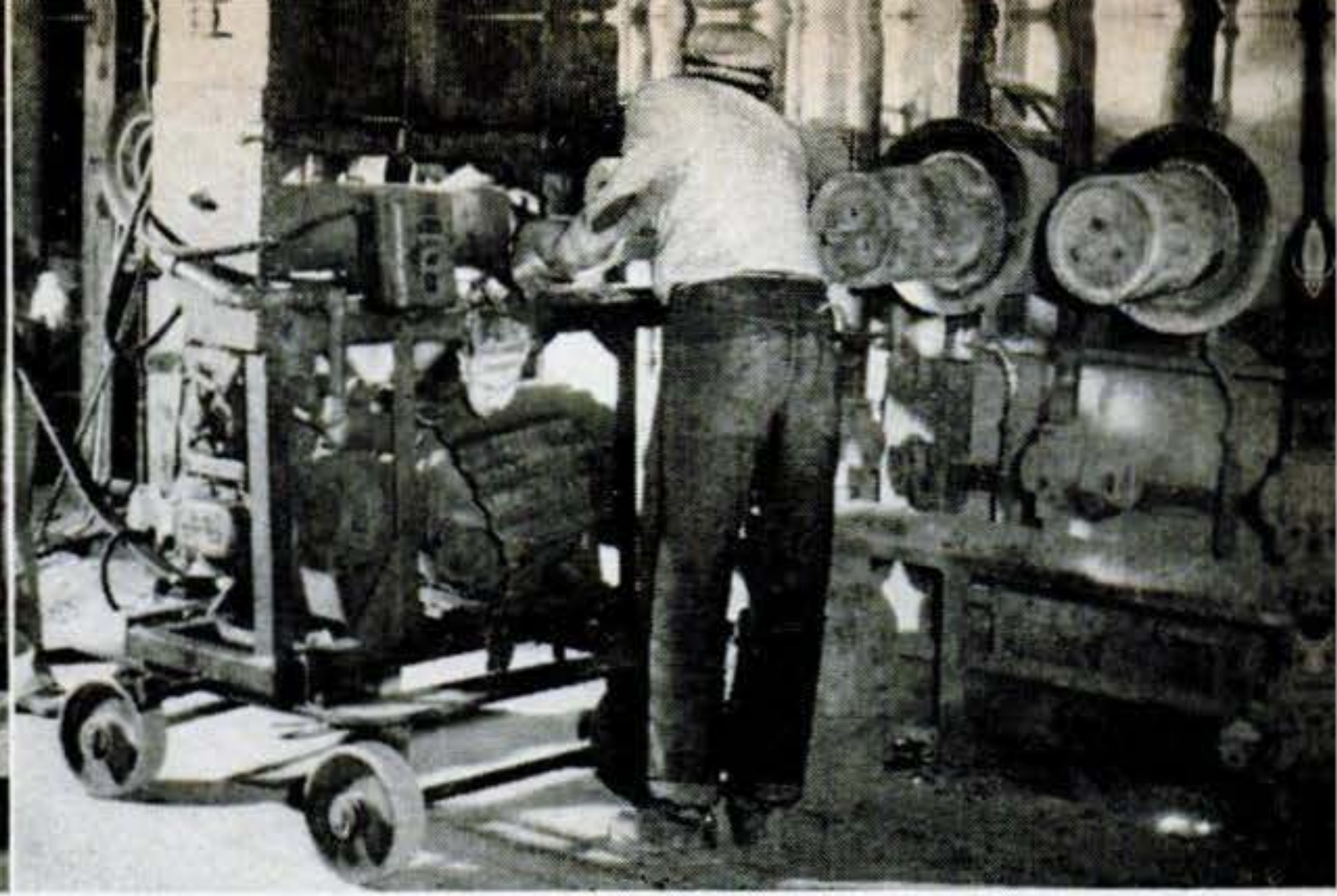


**SEA WATER AND ROCK** are the two sources of magnesium. At Freeport, Tex., plant at left, Dow Chemical extracts 1,270 units of mag from every million parts of salt water. Before defense program, all U. S. mag came from here. Below is pile of dolomite, a common form of limestone, at Manteca, Calif., magnesium plant owned by Government and operated by Kaiser. Other steps in making magnesium from rock are shown on the next two pages.

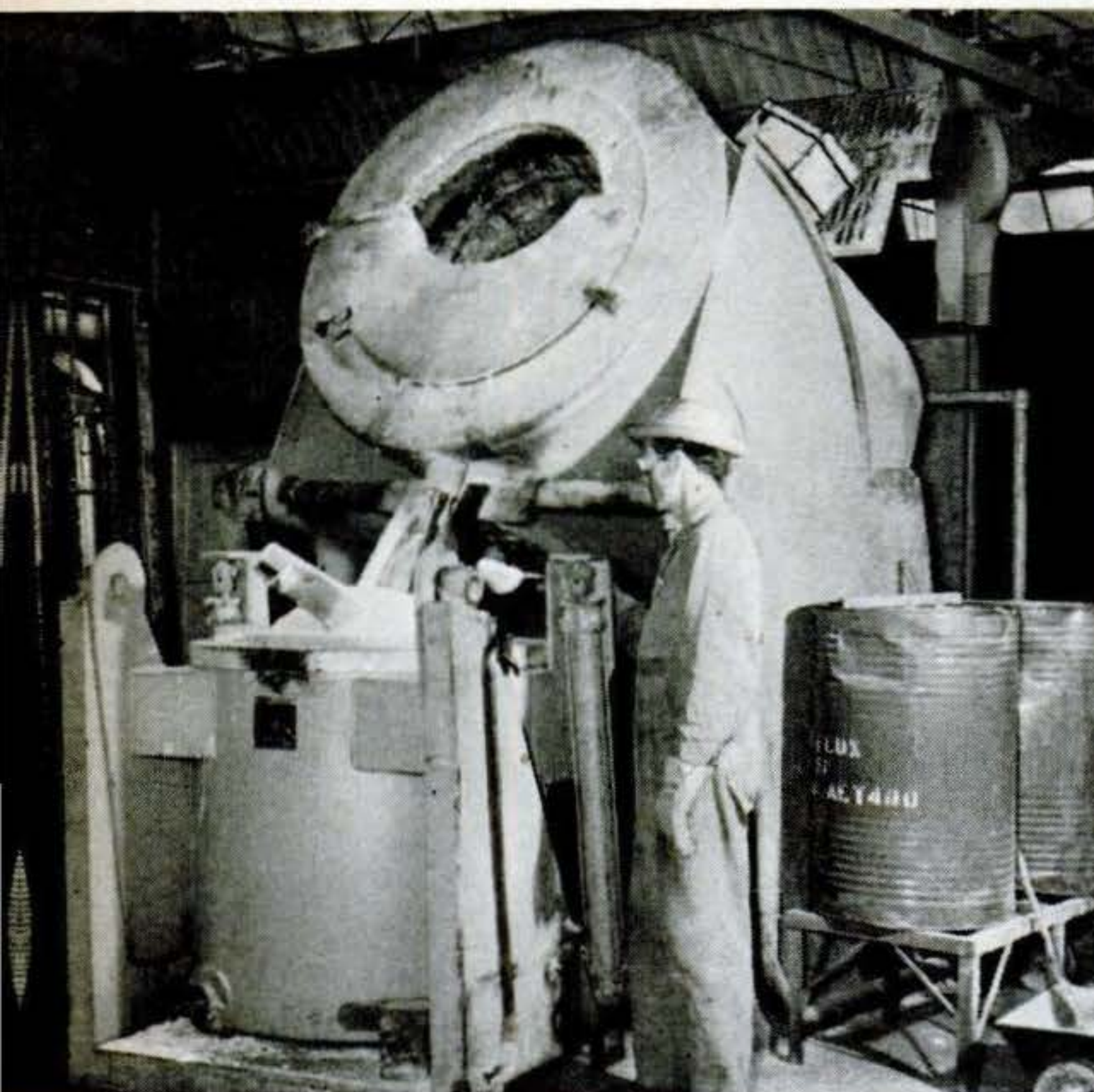




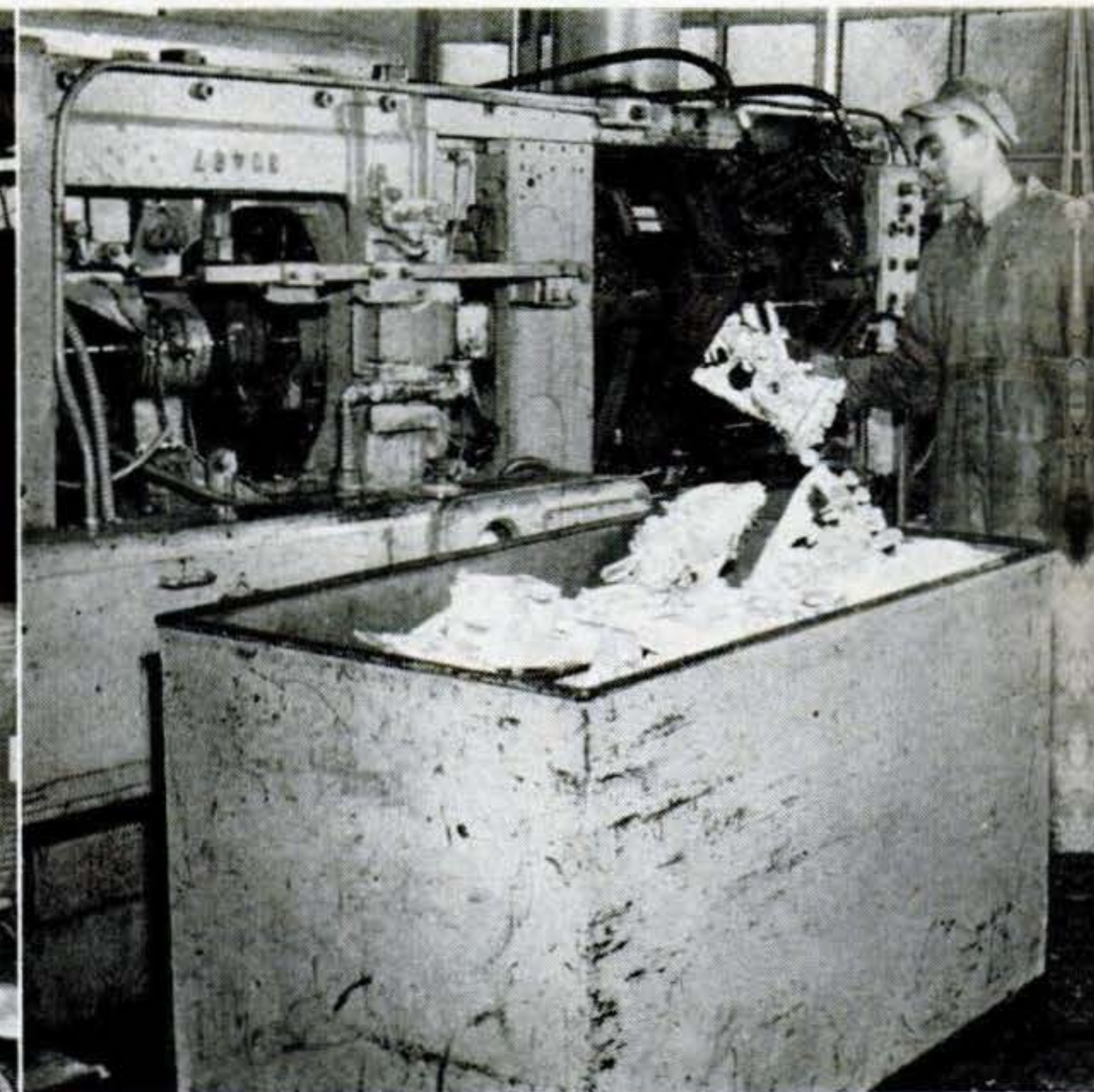
**FERROSILICON**, needed to smelt magnesium from dolomite, is made from quartz, coke, iron filings. At right above, ferrosilicon slabs leave furnace at Kaiser's Permanente plant.



**MAGNESIUM** is removed from retort in these steel sleeves, which catch metal released from pellets of dolomite and ferrosilicon by 10-hour-long cooking at  $2,140^{\circ}$ .



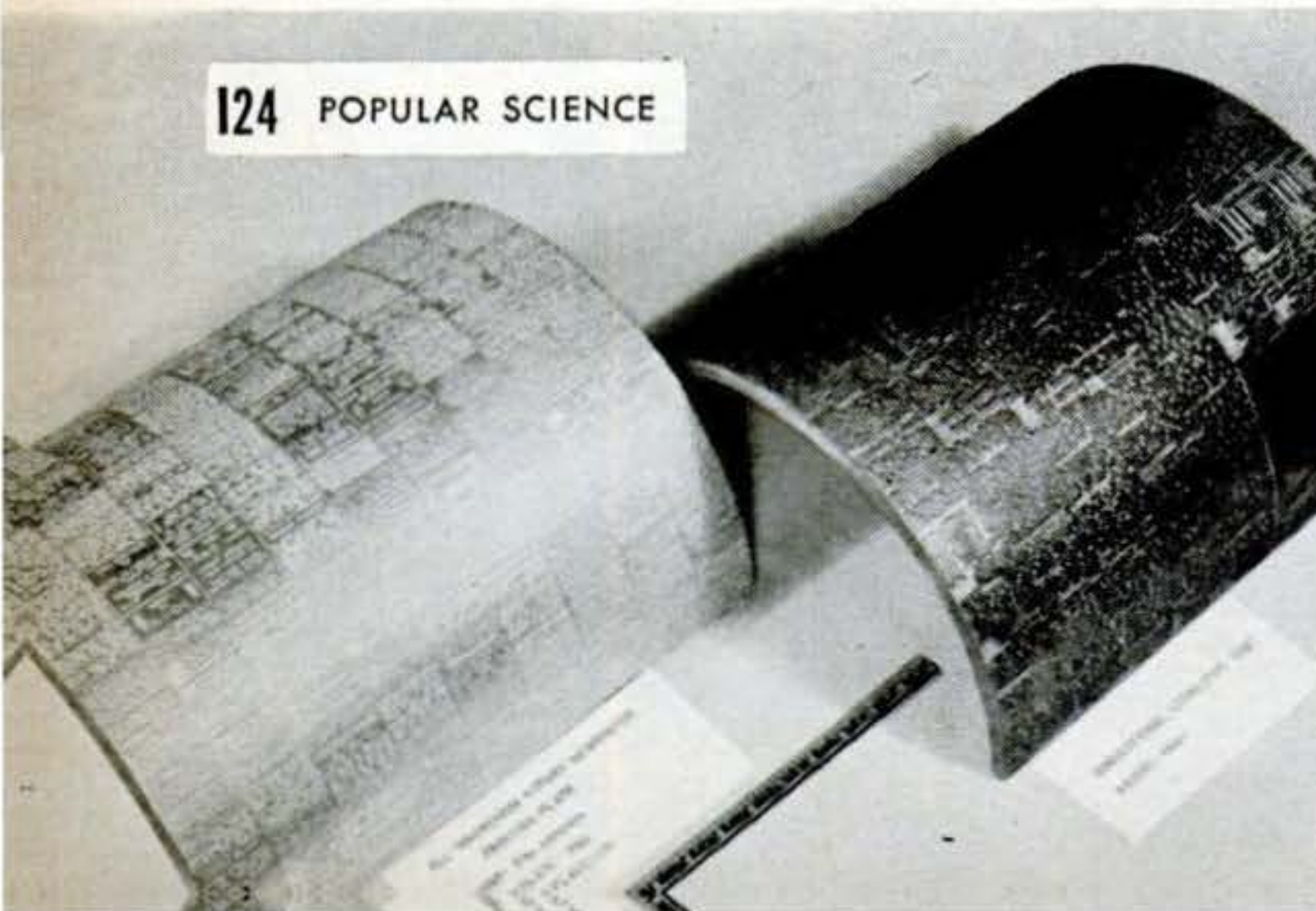
**MELTED IN ELECTRIC FURNACE** at McCulloch Motors' Los Angeles plant, magnesium is poured into transport pot. If metal ignites, flux coat on domes of furnace and pot quenches flames.

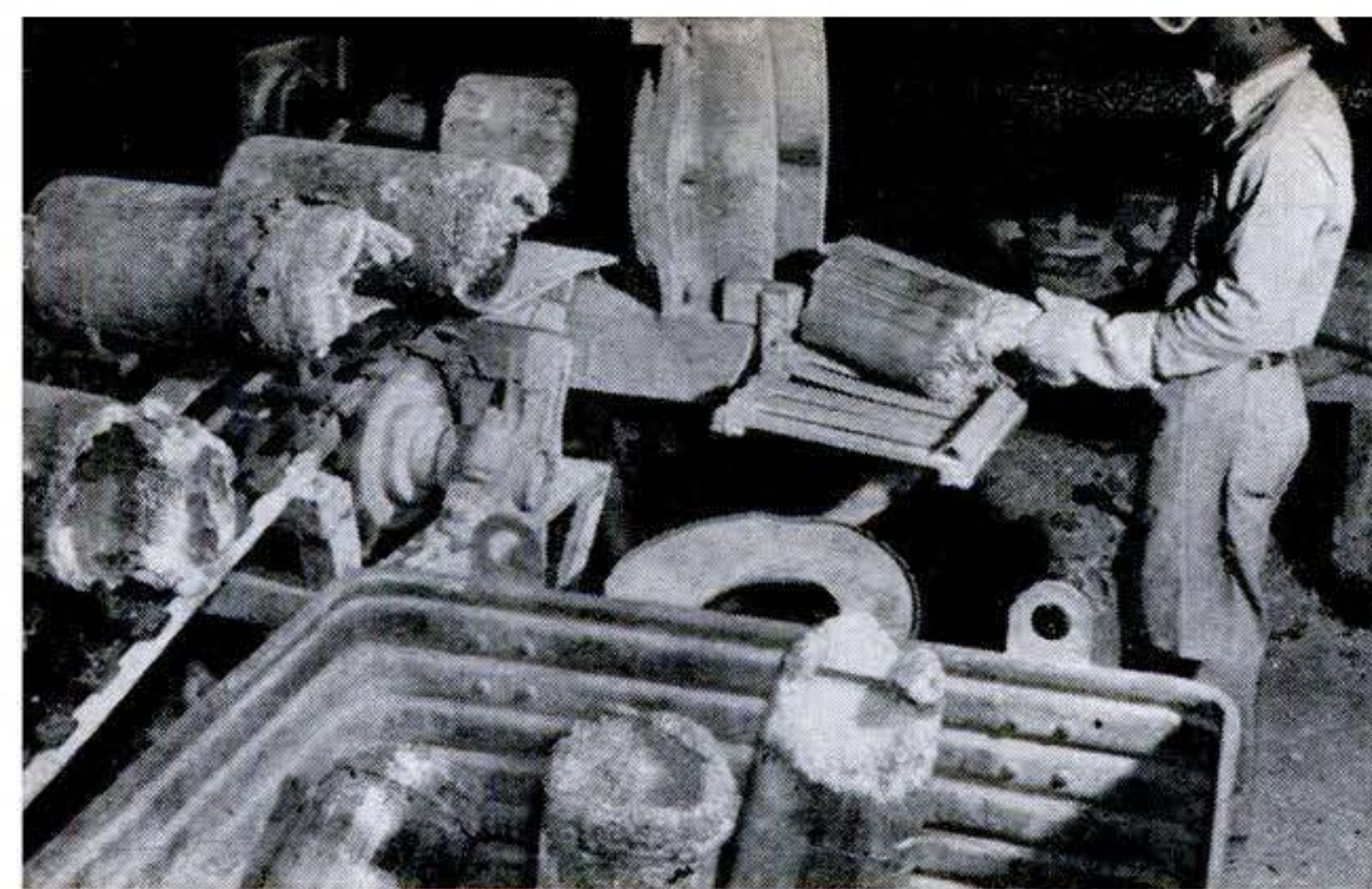


**DIE-CASTING MACHINE** forms magnesium into half a chainsaw crankcase. Injected into die hydraulically at 25,000 pounds per square inch, mag may stay there half a minute.

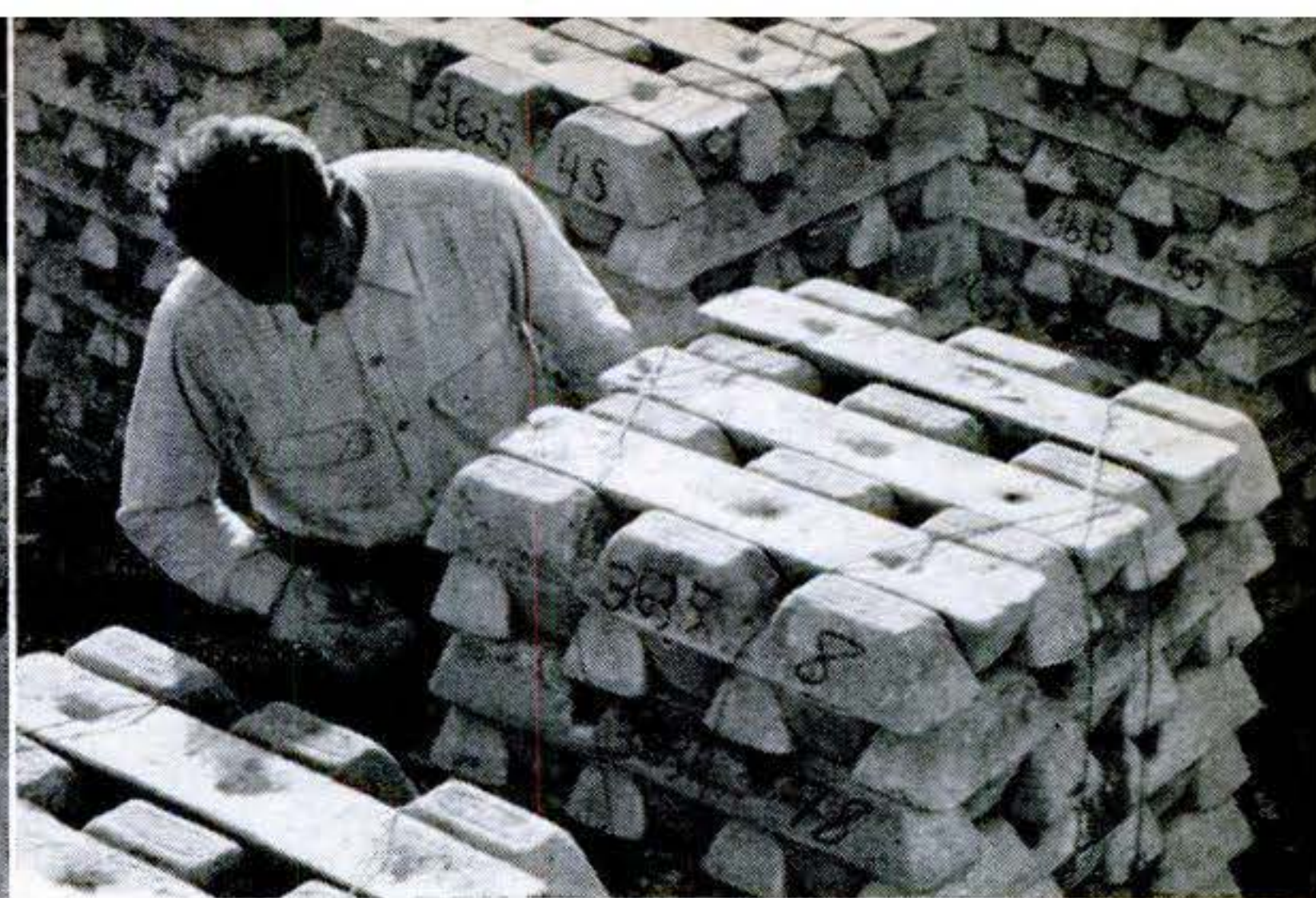
**ALL-MAGNESIUM** rotary printing plate (left below) weighs 35 pounds less than conventional lead plate. Boat (right below) fabricated from sheets and extrusions is extremely light

but strong. One magnesium handicap has been its tendency to corrode in salt water. Now Navy has plastic anti-corrosion primer, may build magnesium hulls for flying boats.





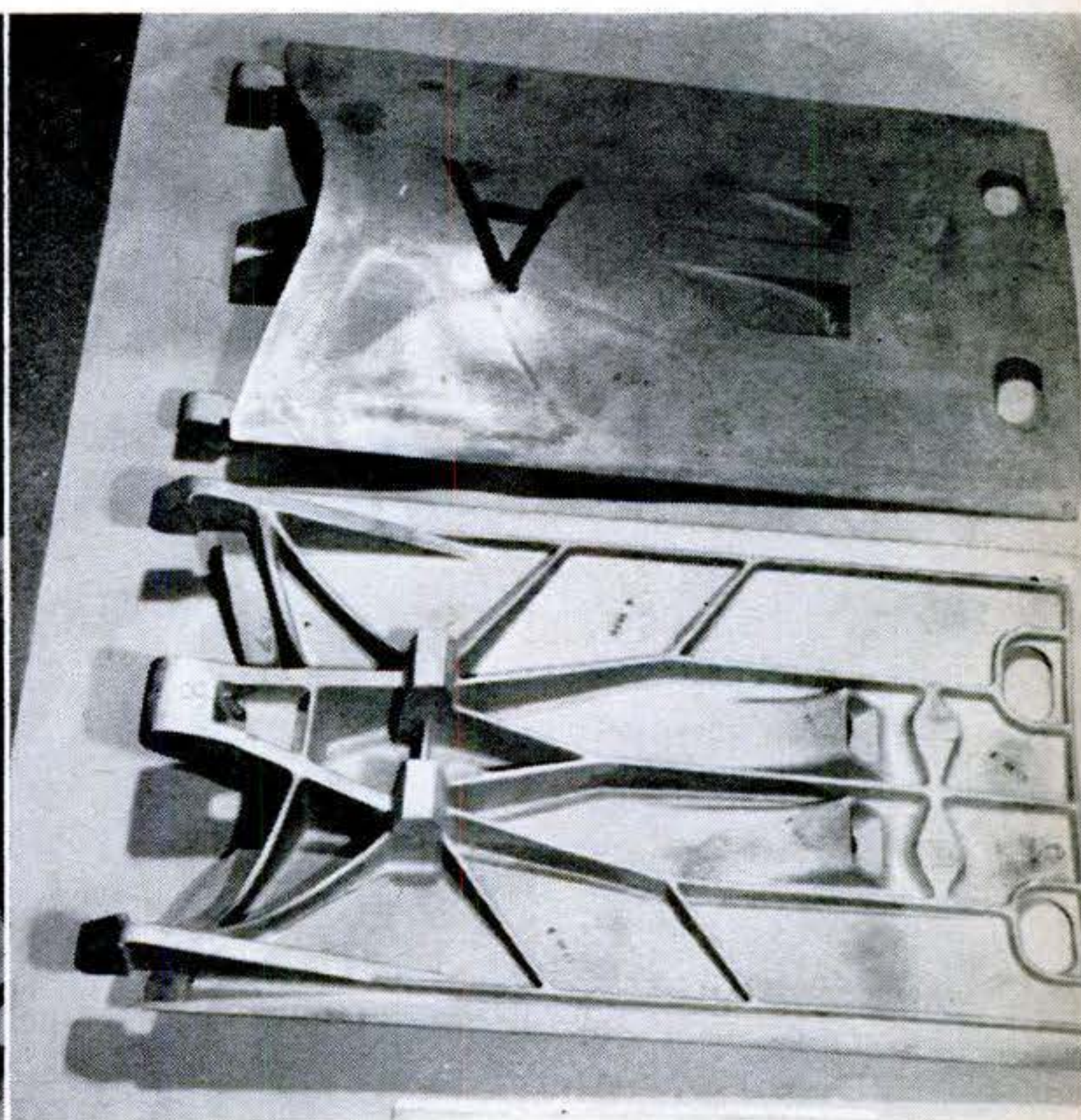
**"MUFFS"**—cylinders of crystallized mag—are pushed from sleeves hydraulically. Muffs form when magnesium, driven from pellets as a gas, condenses on cool end of retort.



**STACKS OF MAGNESIUM INGOTS** are final product. Before ingots were poured, magnesium was further refined in furnaces until 99-percent pure. Ingots now go to the fabricator.

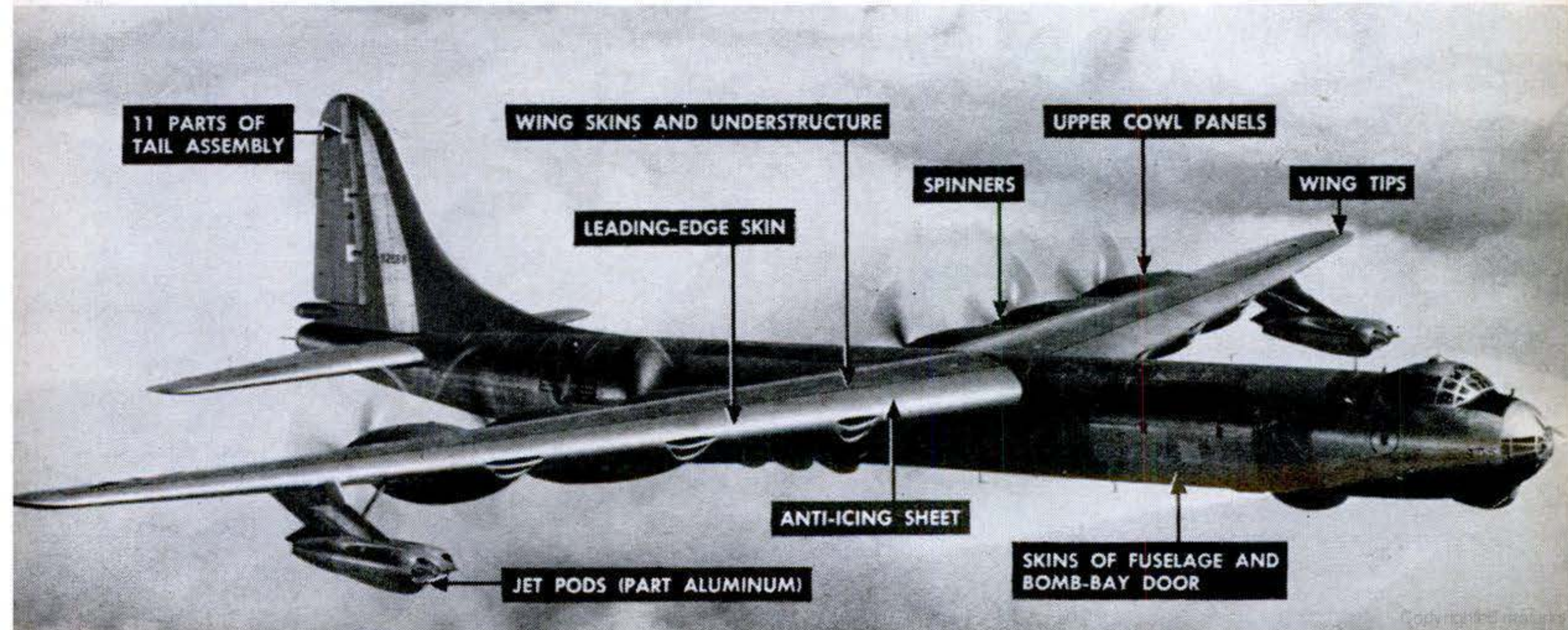


**MAGNESIUM** requires no flux when welded by Northrop's Heliarc process (above). Helium or argon gas from tube (at right) bathes arc and weld areas, keeps air from molten weld.



**MAGNESIUM-ALLOY CASTINGS** for dive flaps on F-94 interceptors have replaced old bits-and-pieces assemblies. Skin of one-piece flap is  $\frac{1}{8}$  inch thick, shaped to plane's contour.

Huge B-36 bomber uses magnesium both for frame parts (indicated on photo) and equipment.



# I'd like to see them make...

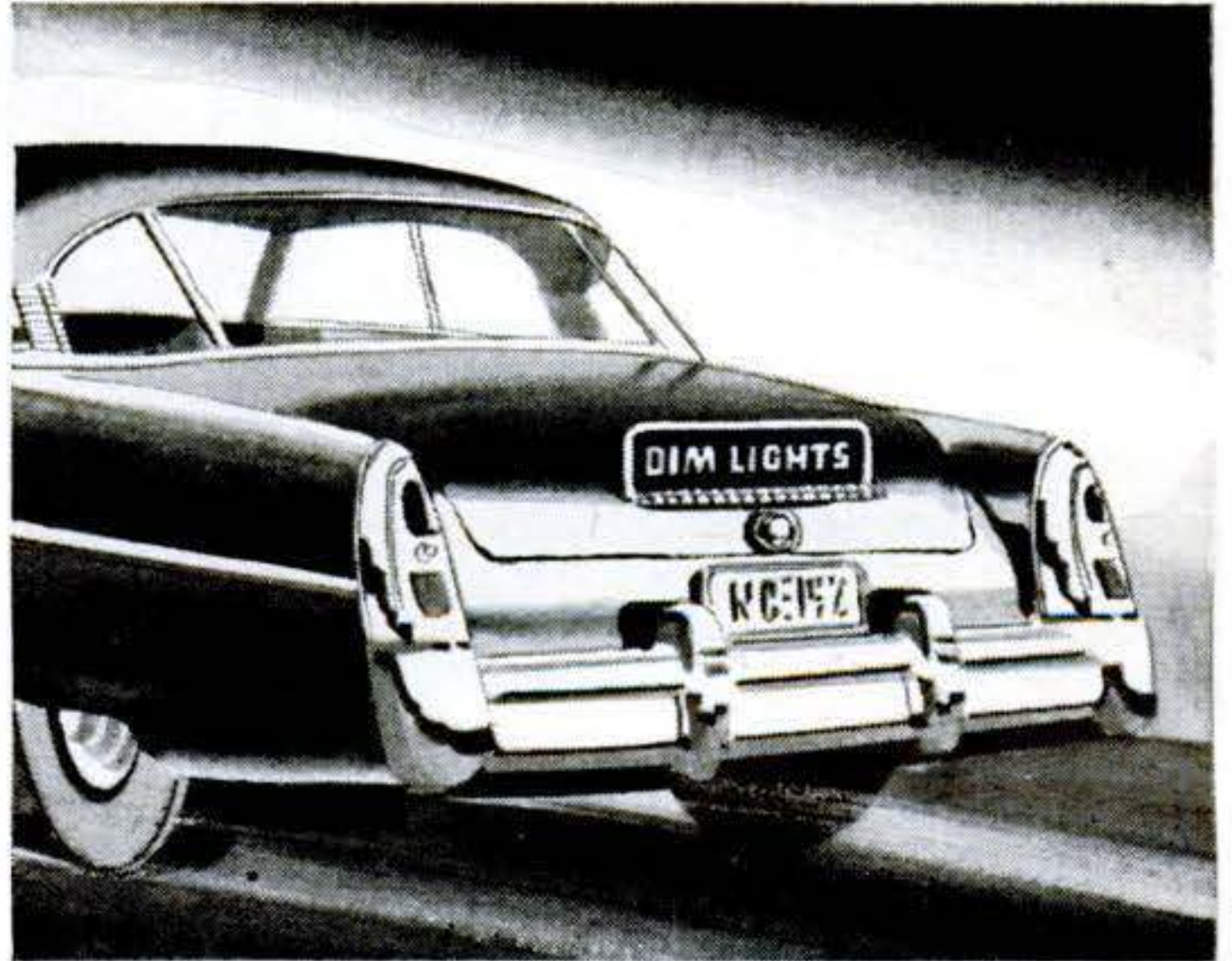
Everyone has his own pet idea of some gadget he would like to see in general use. What is YOURS? *Popular Science Monthly* will pay \$5.00 for each one published. Use government postcards only. Contributions cannot be acknowledged or returned.



**AN ELECTRICALLY HEATED TEDDY BEAR** or doll to be used as a child's bed warmer. The cord could be unplugged for daytime play.—*Lucille Denton, Grand Haven, Mich.*



**A CHANGE MAKER** for pay telephones, like those on some soft-drink dispensers. It would be mighty convenient when you were in a hurry.—*Leroy Steinberg, Calumet, Minn.*



**A BLINKER** to signal the motorist behind you to dim his high beams, reducing the hazard of a blinding reflection in your rear-view mirror.—*Stiles Winterhalder, West Haven, Conn.*

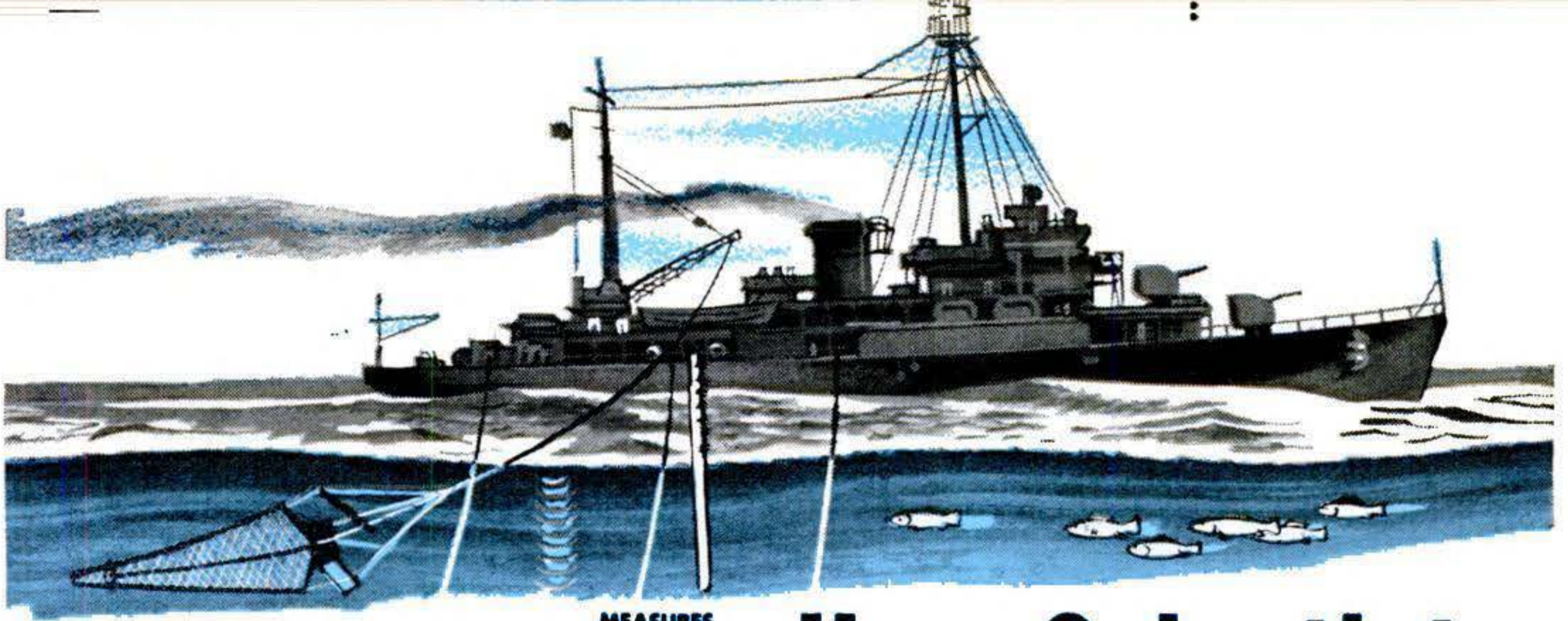


**A BATHTUB** with the drain located at the opposite end from the faucets. This would make it a lot easier to wash out the tub.—*Bob Riddle, Sante Fe, N. M.*



**A BUZZER** connected to a car speedometer. Set to go off at a safe maximum speed, it would remind a forgetful driver how fast he was going.—*Frank Goldstein, Pittsburgh.*





TOWED BY SHIP UNDER WAY, CAPTURES FISH AND OTHER MARINE ORGANISMS FOR STUDY.

MEASURES WAVES ELECTRICALLY AS THEY RISE AND FALL ON 36-FOOT STAFF. DAMPING DISK BELOW POLE HOLDS IT STEADY.

# How Scientists Explore the Deep Sea

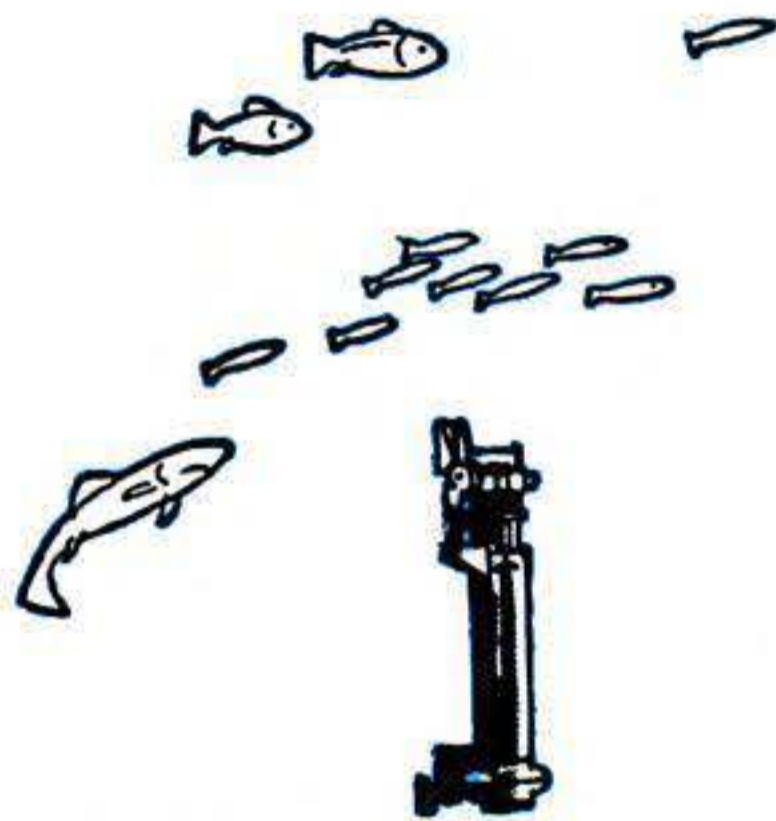
*It is yielding its age-old secrets as oceanographers delve into the world below the waves.*

**By Kendall W. Goodwyn**

FOR thousands of years men have sailed on the seas. In search of adventure or gold they have penetrated the remotest corners of the land. But only now, in the 20th century, have they begun to probe under the surface, into the depths of the oceans that cover seven-tenths of the earth.

There, thousands of fathoms down in the eternal darkness of the deep sea, lies buried treasure infinitely more precious than pirate's gold—the secrets of our earth's history, the mysterious origins of the world's climate and the promise of inexhaustible reserves of raw materials.

You get some idea of the U.S. Navy's interest from Task Unit 49.6.5. This is Navy jargon for two seaplane tenders, the USS *San Pablo* and the USS *Rehoboth*, which



COLLECTS

WATER SAMPLES FOR CHEMICAL ANALYSIS. SEVERAL ARE LOWERED ON ONE LINE TO VARIOUS DEPTHS.



RECORDS CHANGE IN WATER TEMPERATURE WITH DEPTH AS TRACE ON SMOKED-GLASS SLIDE.



GAUGES

DEPTH OF WATER BY SENDING DOWN SIGNAL AND MEASURING ELAPSED TIME BEFORE ECHO RETURNS.

TRAPS SEA-BOTTOM SAMPLE. PILOT WEIGHT STRIKES FIRST, RELEASING HEAVY CYLINDER-LIKE GIANT APPLE-CORER—TO DRIVE ITSELF INTO SEA FLOOR.



were pulled out of moth balls four years ago and assigned to the Oceanography Division of the Hydrographic Office. Already they have steamed a total of 170,000 miles, from Africa to the North Sea, from Iceland to the Caribbean, in pursuit of the sea's mysteries.

### *What the Seagoing Scientists Are Doing*

Armed with a bewildering array of mechanical and electronic devices, these 2,700-ton, 310-foot Diesel-powered sister ships are charting the sea's currents, analyzing its chemistry, examining its plant and animal life. They are studying the characteristics of sound waves, measuring the transparency and electrical conductivity of sea water, mapping the contour of the ocean floor and bringing up from depths as great as 2,400 fathoms (14,400 feet) core samples that are filling in whole chapters missing from the geologic history of our planet.

The Hydrographic Office is the first to emphasize that oceanographic research is an international, cooperative undertaking. While standing on the main deck of the *San Pablo* watching the preparations for lowering a BT—the diving thermometer that looks like a rocket shell—the writer was buttonholed by Bob Abel, civilian scientist from Hydro. His grin was disarming but his tone was dead serious. "I don't know what you're going to write about us," Abel said, "but there's just one thing—don't say Hydro is doing it all. Oceanography is an awfully big field."

You begin to understand what he means when you learn that Hydro is working hand in glove with most of the seafaring nations on this side of the Iron Curtain, that other agencies like the Coast and Geodetic Survey and the Fish and Wildlife Service are conducting their own researches, and that the great private scientific organizations are a major factor in the program. The work of the famed Oceanographic Institution at Woods Hole, Mass., the Scripps Institution of Oceanography at La Jolla, Calif., and Columbia University's Lamont Geological Observatory is, month by month, adding to our mounting treasury of maritime knowledge.

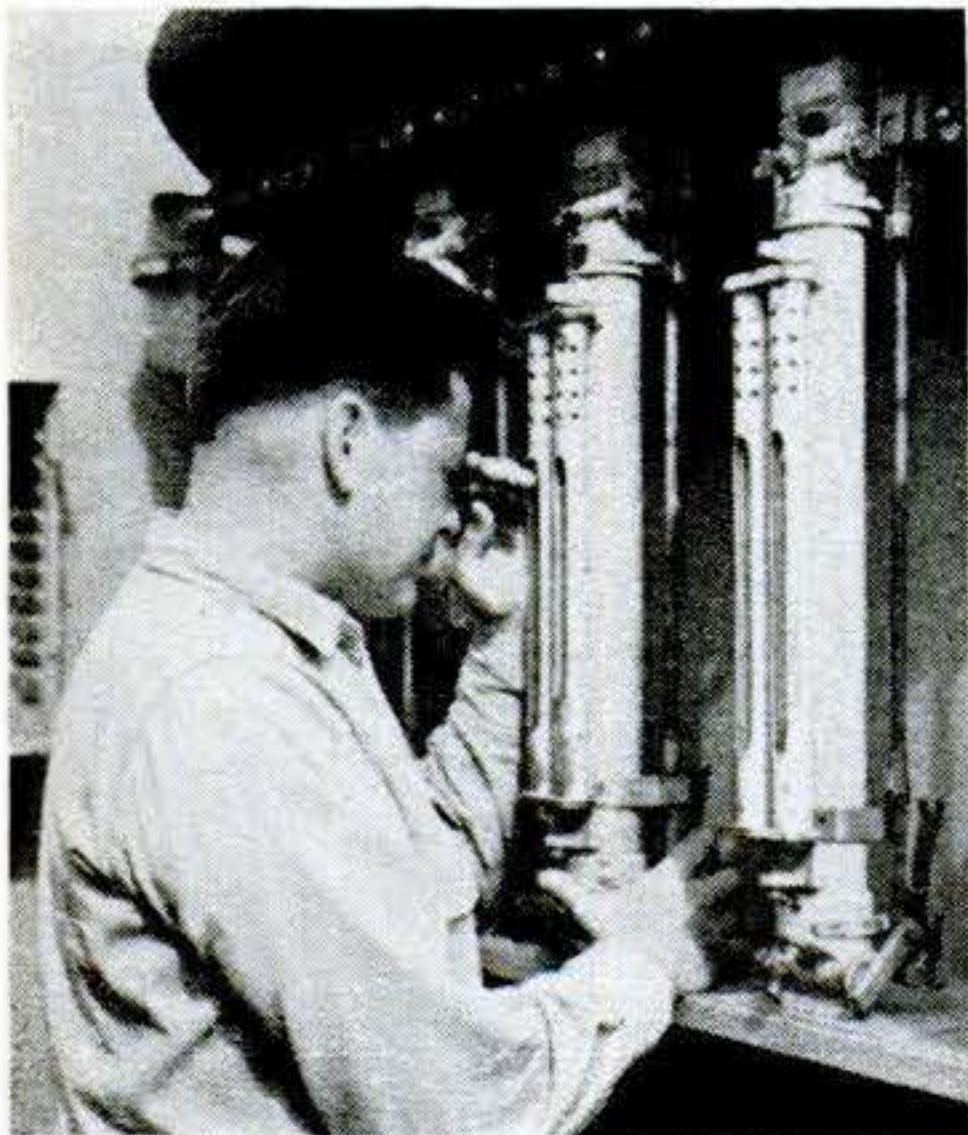
And there is a steady flow of information into Hydro from individual ship's officers all over the world who are voluntarily contributing navigational data picked up as they go about their jobs.

### *Submarine Mountains*

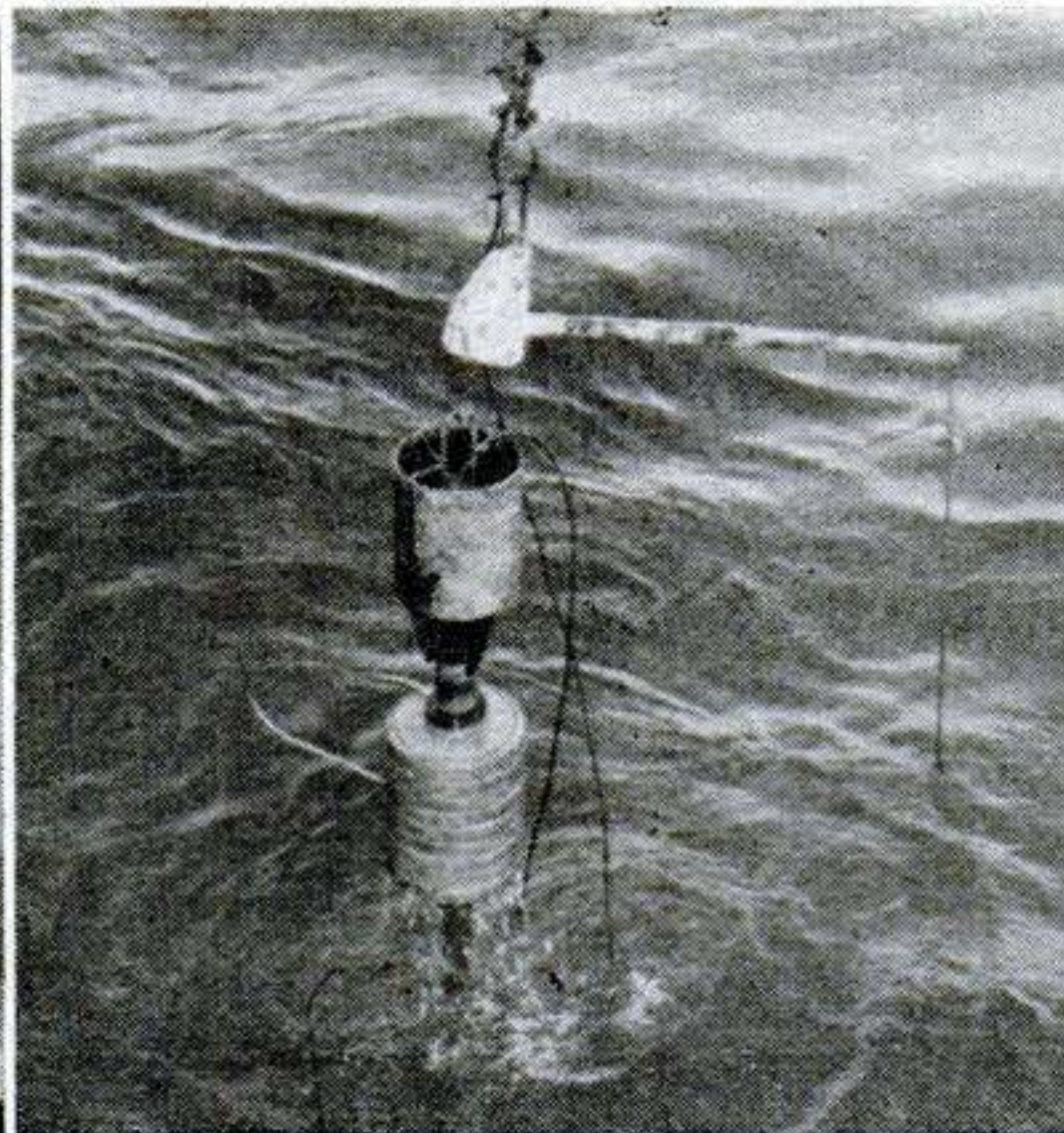
Until recently the sea floor was thought of as a more or less level plain. Now we are learning that the topography of the ocean bottom is as varied as that of the land, possessing many of the same features on an even grander scale—great mountain chains extending for thousands of miles, plateaus, valleys and volcanoes, and fissures and depths that dwarf the loftiest land peaks known to man.

North of Puerto Rico lies the Milwaukee Depth, the deepest place in the Atlantic (the world's saltiest ocean, by the way). If

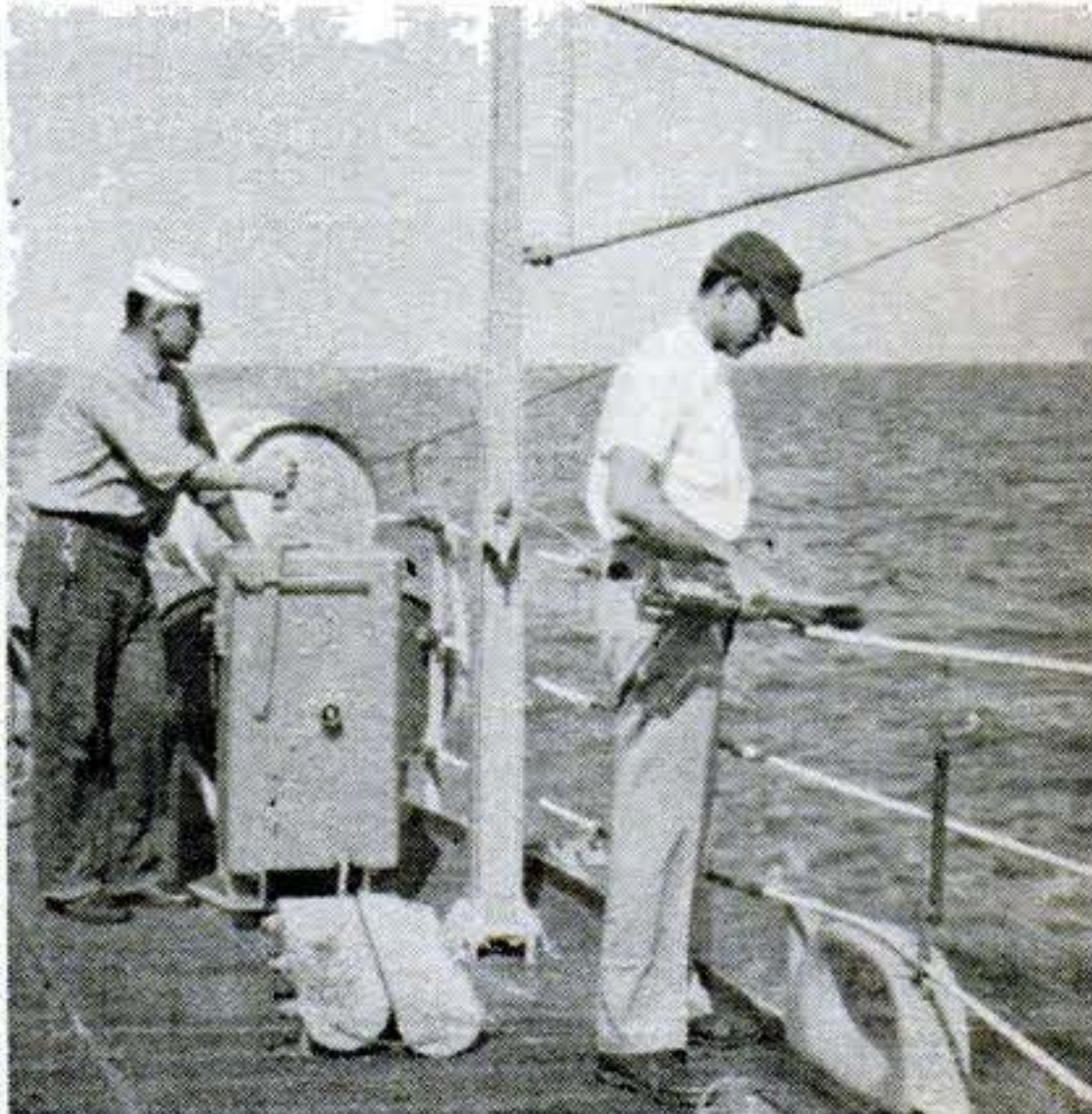
**READING THERMOMETERS** on Nansen bottles containing seawater samples. Temperature indicates depth at which sample was taken. Bottle is named for explorer Fridtjof Nansen.

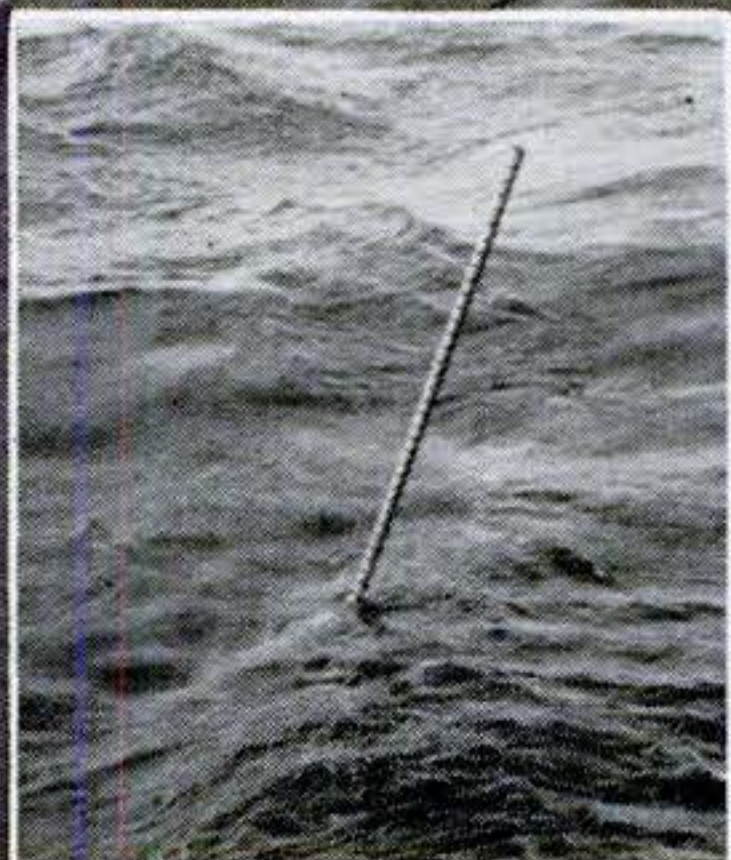
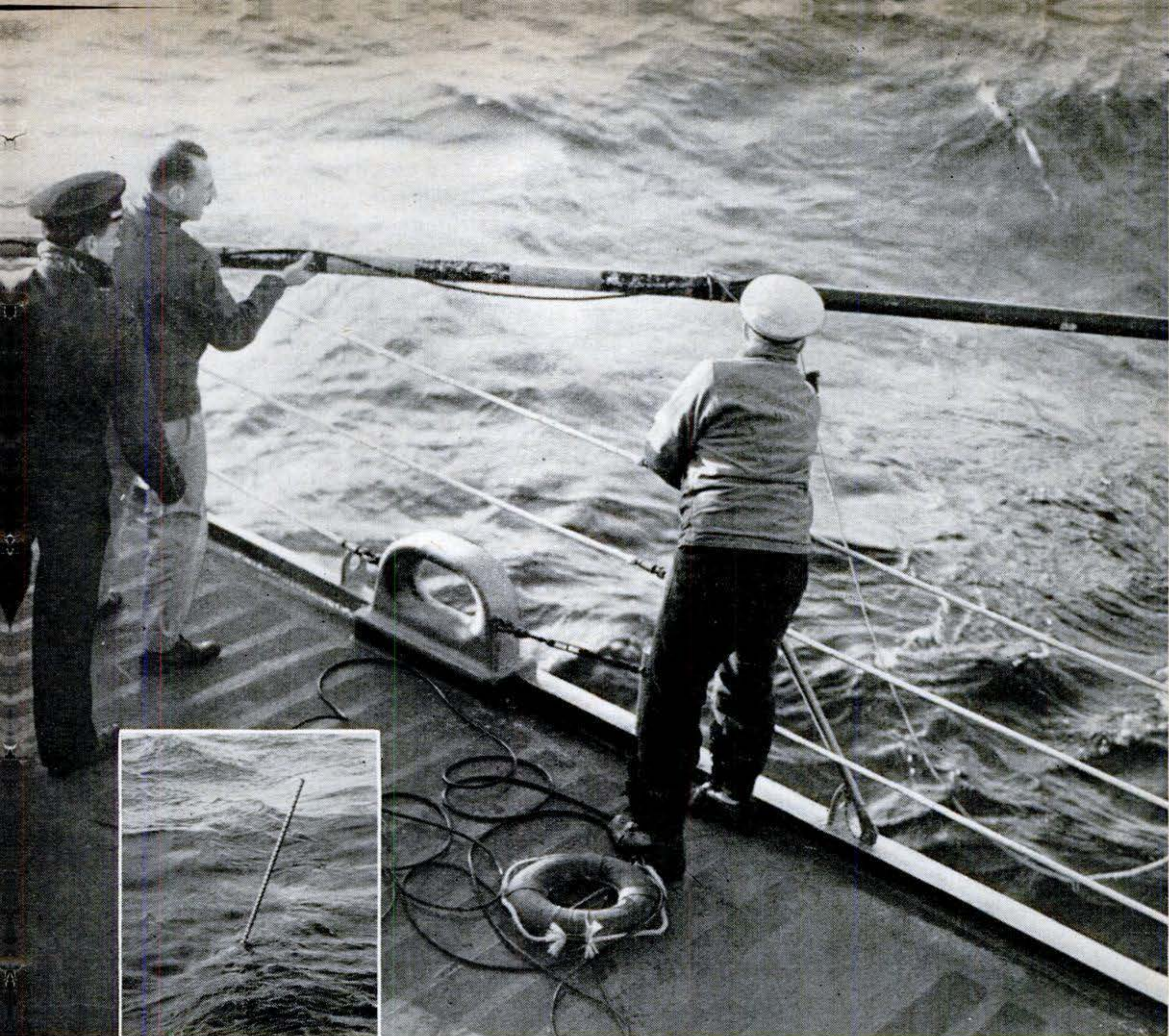


**EWING CORER**, a 1,000-pound, 40-foot steel tube, is dropped overboard in deep water from stationary vessel. It digs itself into ocean floor, brings up core sample for study.



**PREPARING TO LOWER** a bathythermograph from ship's fantail. Interaction of a pressure element with a thermal element in the BT records water temperature against depth.





**THE WAVE STAFF GOES OVERSIDE.** Rising and falling water makes and breaks electric cir-

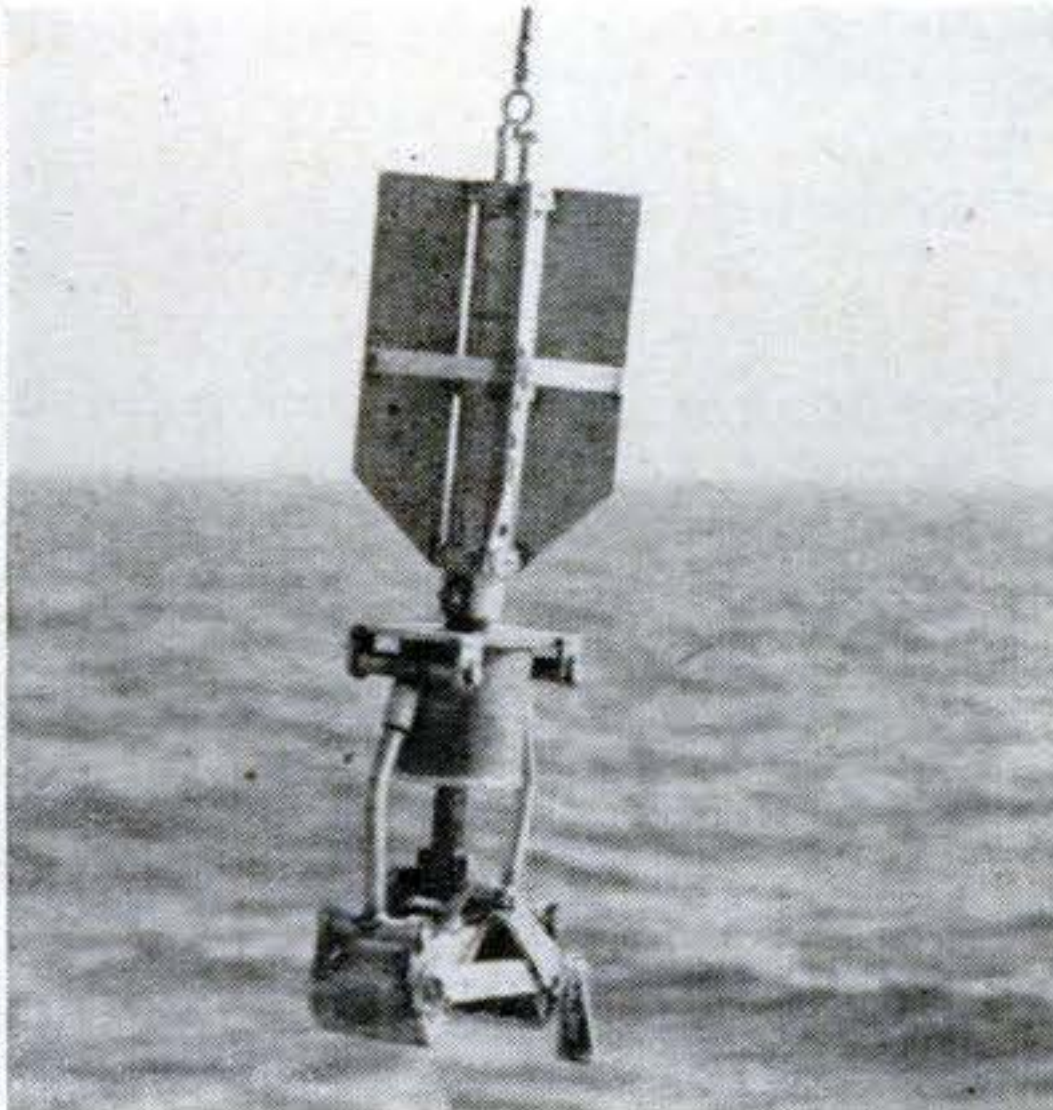
cuits. Cable carries impulses to recorder on ship to graph waves' height and frequency.

*Official U.S. Navy Photos*

**UNDERWATER CAMERA** takes flash picture automatically when staff hits bottom. New underwater TV camera with suspended lights will let scientists study sea floor at leisure.

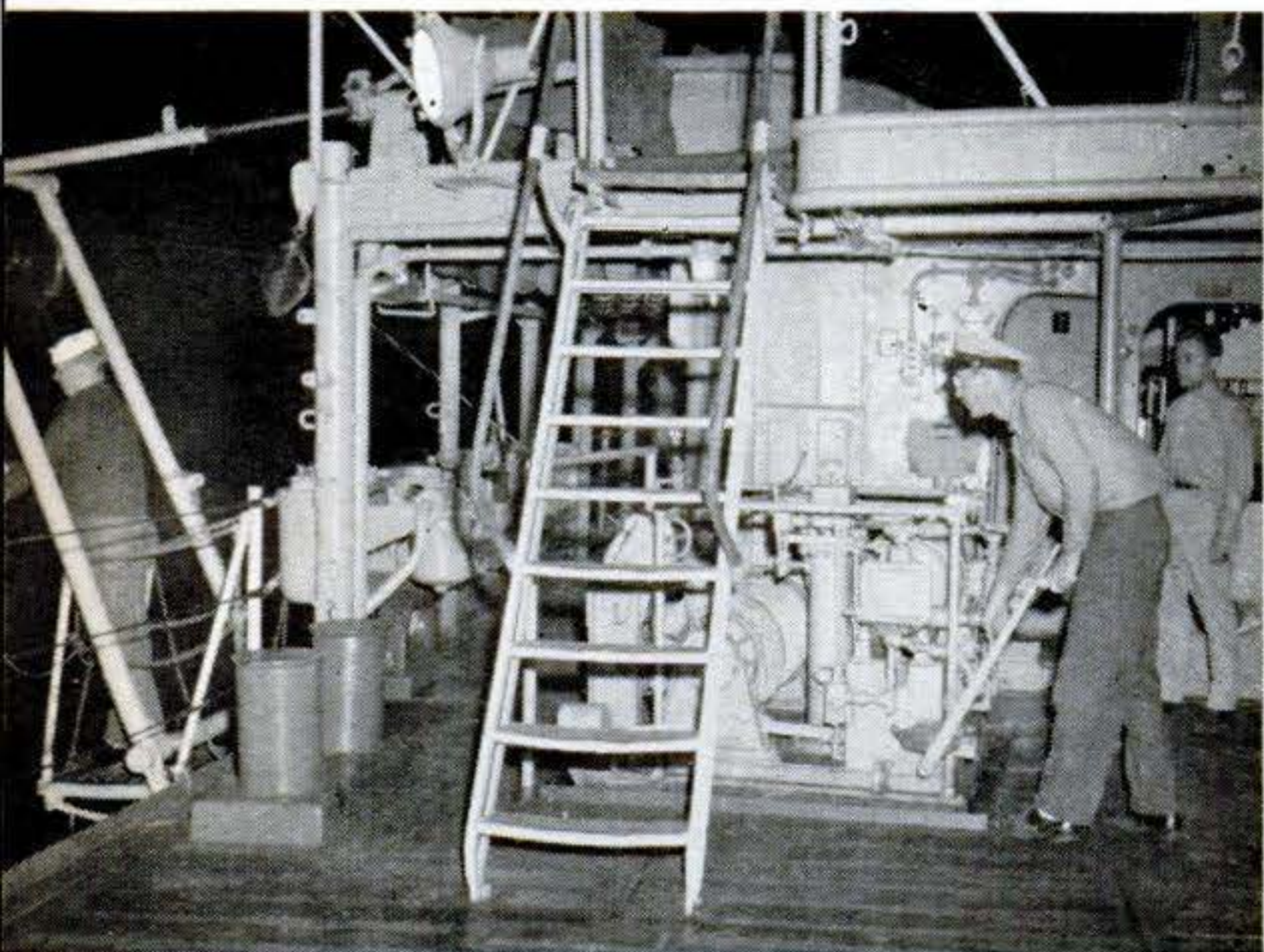
**THIS "SNAPPER"** takes a bite out of sea bottom. After preliminary analysis, samples collected by various instruments at sea are sent to Hydrographic Office in Washington, D. C.

**LT. A. J. ARSENEAULT** of the *San Pablo* holds a plastic tube full of sea-floor sediment. Sample was taken with a Phleger corer, smaller version of the Ewing corer on opposite page.





**MID-WATER TRAWL**, a conical 35-foot net with a 10-foot mouth, collects marine specimens. A new type will have electrically charged mouth to repel captured fish, prevent their escape.



**HYDROGRAPHIC WINCH** hoists and lowers instruments 500 feet a minute on 20,000 feet of 5/32" wire. Built-in accumulator, similar to fluid drive in auto, absorbs sudden strains.

**CRUSHED NANSEN BOTTLE**, looking as if it had been squeezed in the grip of a giant hand,

you should take a West Indies cruise your ship may pass over it. You'll be a little more than five and a half miles from land—straight down! But in the Pacific there is a deeper point. British scientists recently reported that they found a depth of 35,640 feet in the Marianas Trench near the island of Guam. By comparison, Mount Everest, whose towering summit is still unscaled, rises only 29,000 feet above sea level.

### ***Ocean Has Three Great Divisions***

The average depth of the ocean is 12,450 feet (10 Empire State Buildings piled one on top of another would just about break the surface) but that is only an *average*. The three great divisions of the sea floor vary widely in depth.

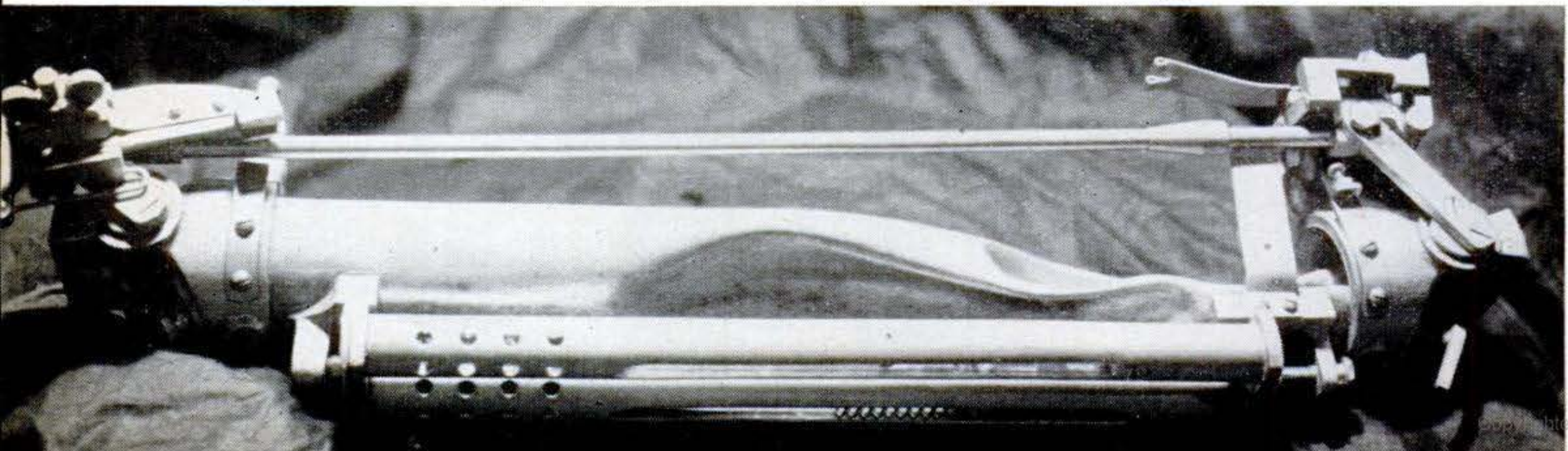
The continental shelf, extending from 20 up to as much as 150 miles from shore, is comparatively shallow. At its outer edge begins the second division, the continental slope. Standing in the chartroom of the *San Pablo* you can watch the sonic depth recorder as it draws a continuous profile of the sea bottom by sending down a sound signal and measuring the time that elapses before the echo bounces back. Suddenly the graph plunges sharply as the ship passes over the slope that leads to the third and greatest division of the ocean bottom, the deep-sea region that comprises 54.6 percent of the earth's surface.

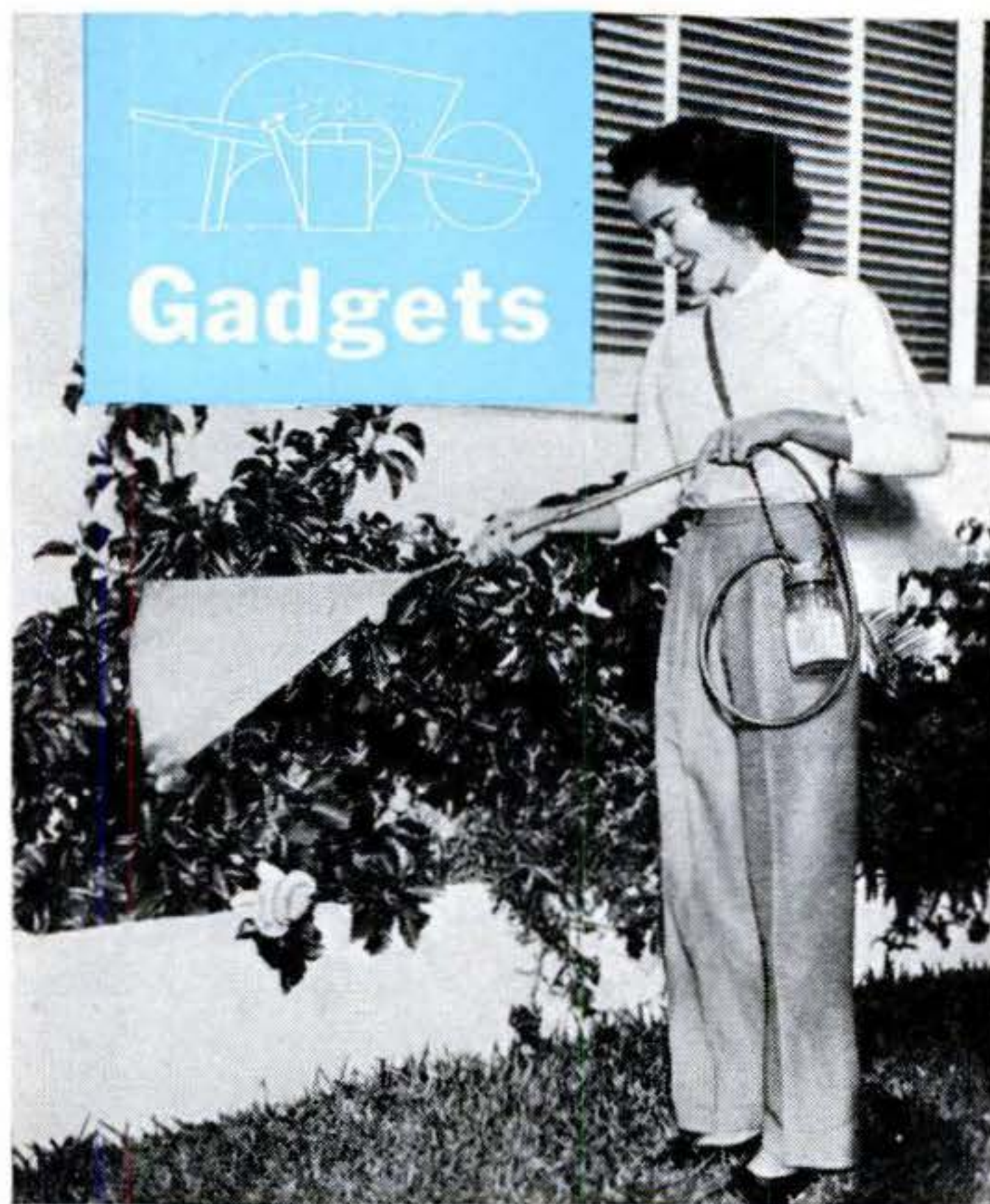
The seagoing scientists are reporting one discovery after another—an undersea mountain off the Maine coast larger than any in the Atlantic states, another seamount 9,500 feet high in the Pacific west of the Columbia River. The path of the Hudson Canyon has been traced from the mouth of the Hudson River at New York City 200 miles eastward, and found to bear a remarkable resemblance to the Grand Canyon.

Deep-sea nets have brought up weird fishes thought to have been extinct for millions of years. The disappearing islands of

[\[Continued on page 242\]](#)

shows tremendous pressure of water in deep-sea region. Air trapped in bottle caused it.





### Sprayer Has Pump in Handle

THE pump for the garden sprayer above is built into the handle. Moving it back and forth throws a continuous spray. The Ken-Sprayall has a carrying strap and jar-top assembly that fits a Mason jar. *Sprayers & Nozzles, Inc., St. Petersburg, Fla.*



### Kit Tests Soil Samples

WITH this kit you can get the inside information on that plot of ground where you have your garden. It will tell you if the soil is sweet or sour, what plant foods it contains, and what fertilizers are needed. You put a little of the soil in a glass and add the proper testing solution. The color of the mixture then is compared with a color chart to show the soil condition. *Sudbury Laboratory, South Sudbury, Mass.*

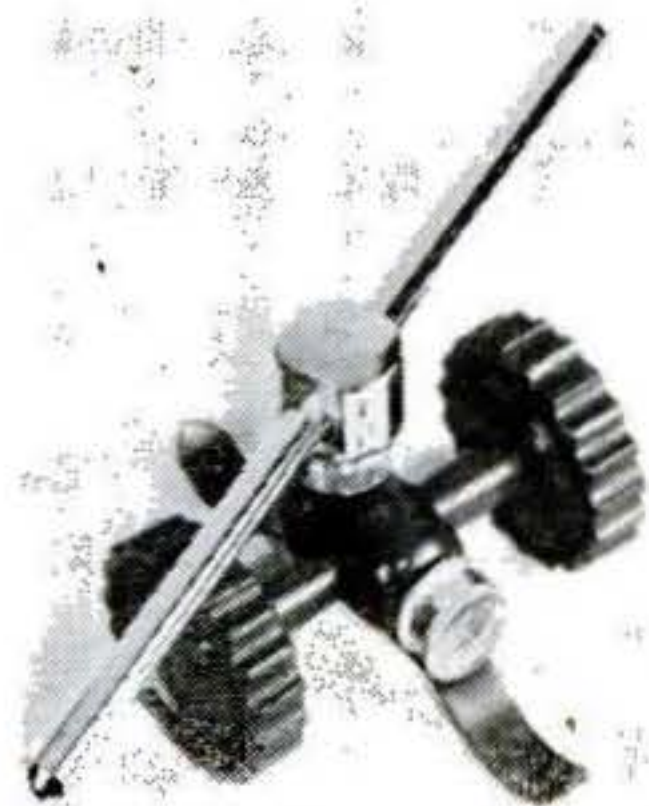


### Shrub Duster Powered by Hand

THE hand-cranked duster above has a centrifugal blower that moves a large quantity of air at low velocity to give a wide dust coverage. Weighing only 10¼ lb., the Cyclo-Junior can be used on trees, shrubs, crops and turf. *Niagara-FMC, Middleport, N.Y.*

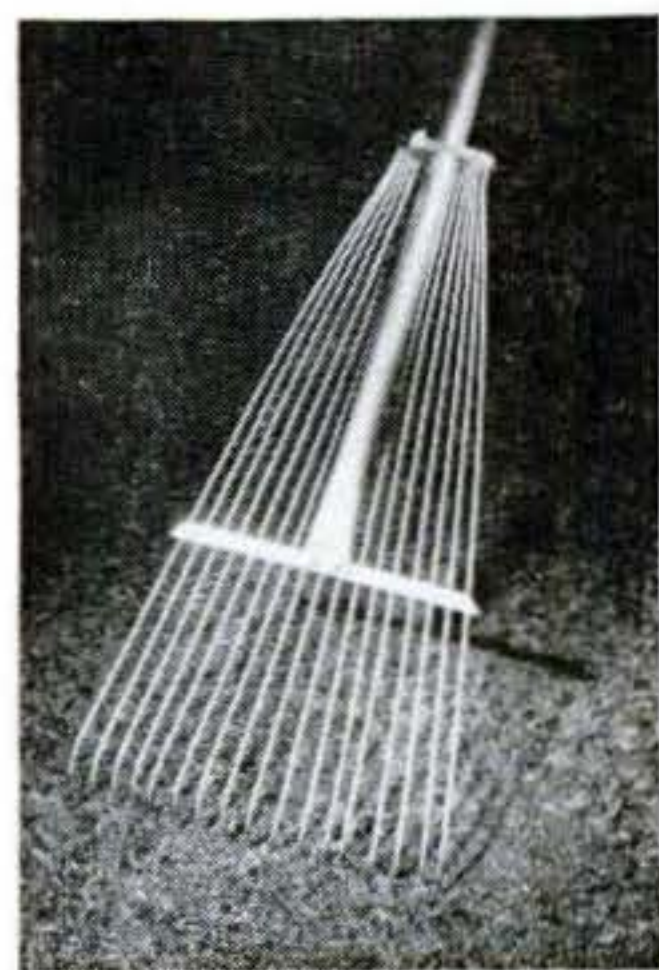
### Hose Controls Lawn Sprinkler

JUST pulling on the hose turns on, shuts off or regulates the amount of water put out by this lawn sprayer. Giving the hose a yank turns the wheels, which control a rotary valve. The Crystal Mist Sprinkler can be adjusted to cover between 5' and 45'. It is rustproof. *Chicago Roller Skate Co., 4406 W. Lake St., Chicago.*



### Aluminum Rake Is Adjustable

BY LOOSENING the wing bolt and sliding the plate down the handle of the Kenco rake, you can change the spread of the tines. A range of 10" to 30" suits various raking needs from gravel to leaves. It weighs 24 oz. *International Industries, P.O. Box 3752, Baltimore.*

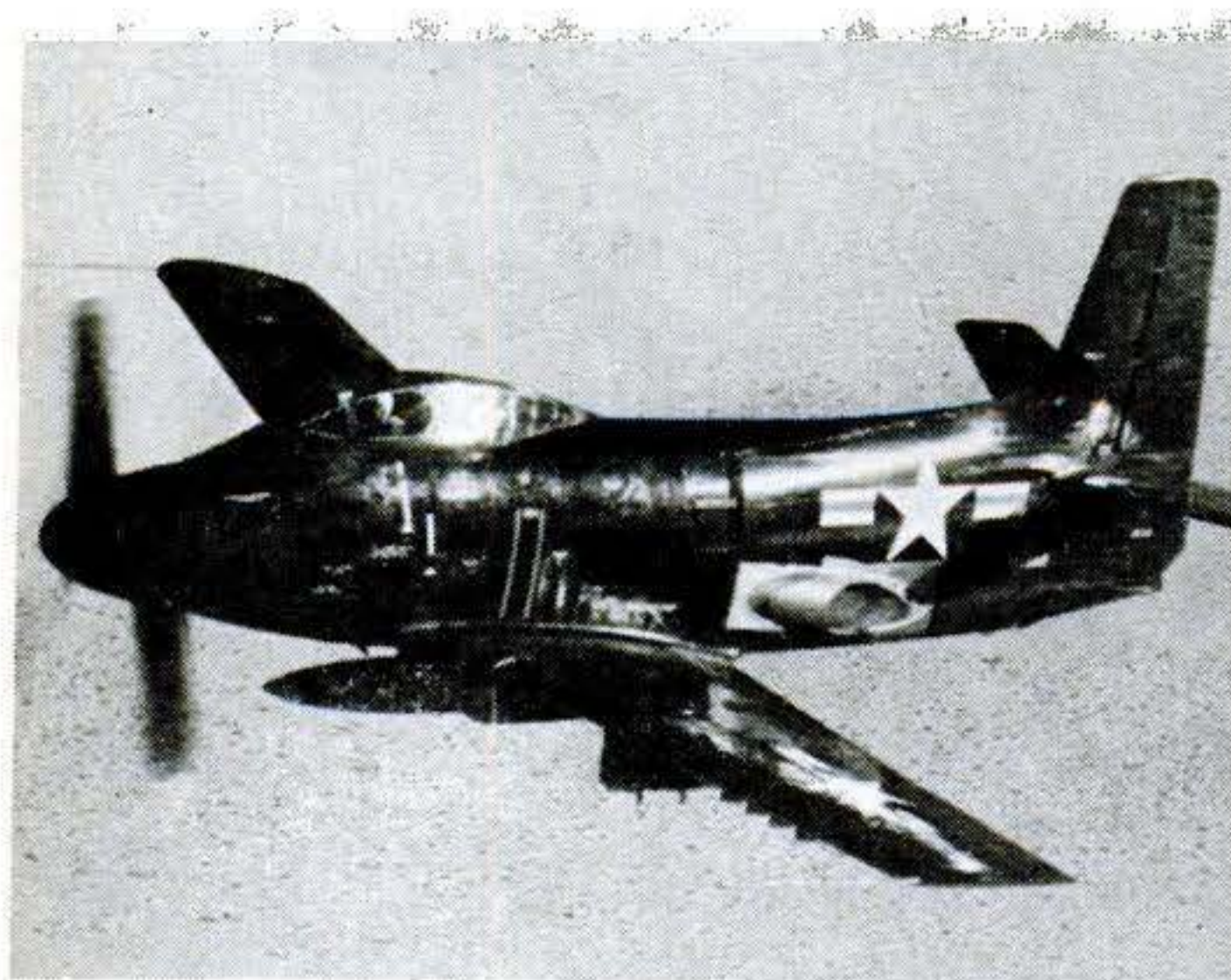




## Biggest Smashproof Bottles to Carry Dangerous Chemicals

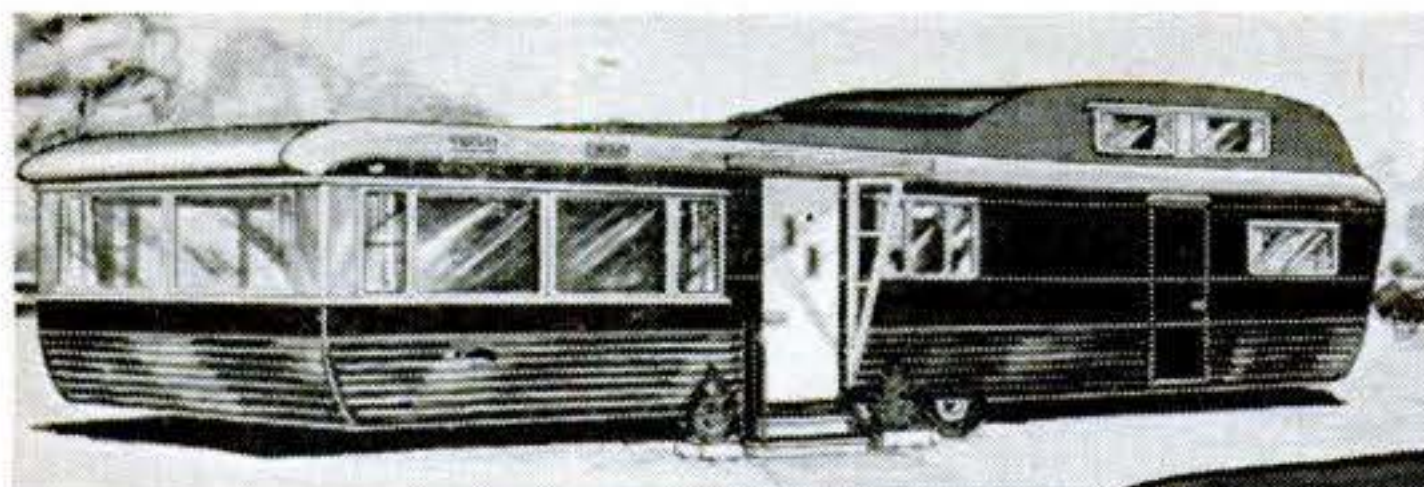
SQUASHED by a 10-ton bulldozer with steel treads, these 13-gallon plastic bottles lost their shape temporarily but remained unpunctured. When jacketed with plywood, they'll be the first smashproof carboys ever

made. They will be used to ship dangerous chemicals that can cause bodily injury, fire, or cargo damage if released from a broken container. The Plax Corp., Hartford, Conn., makes them.



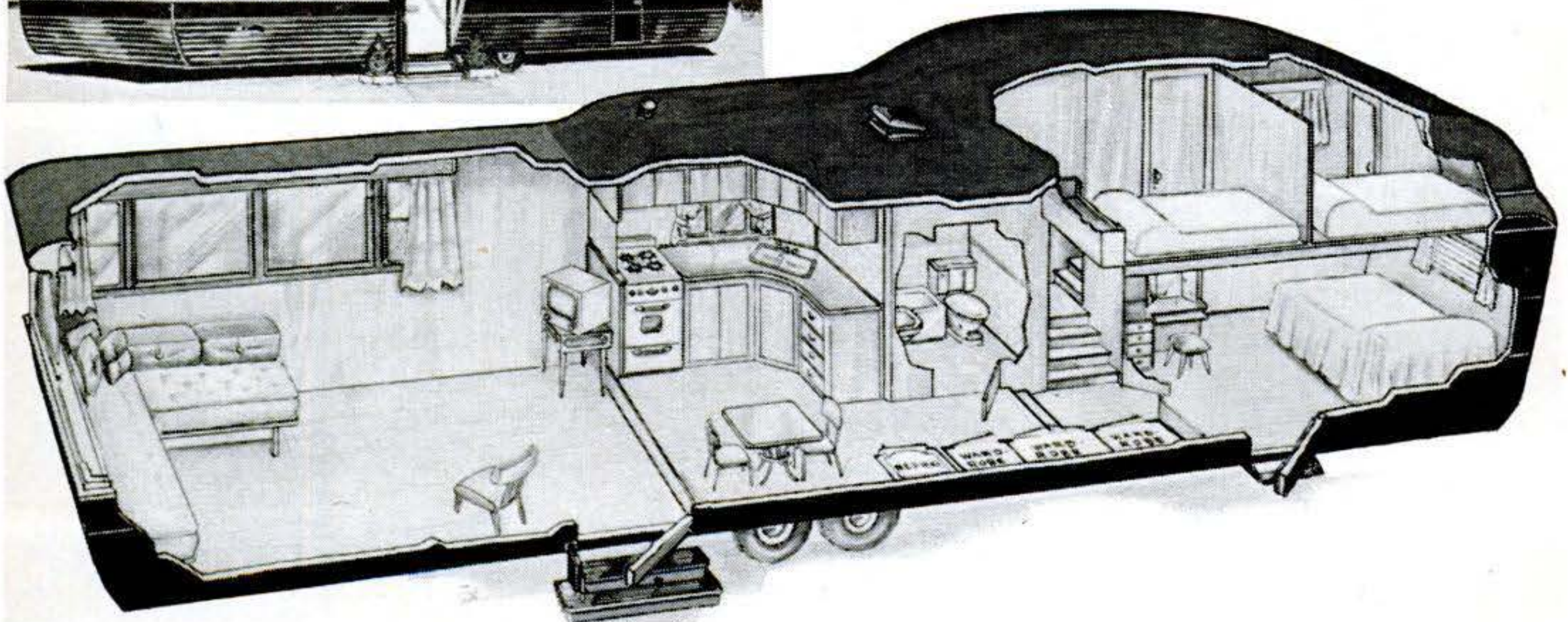
## Navy Gets New Carrier Bomber

TWIN turbines driving a six-blade contra-rotating prop power the Navy's newest bomber, the stubby Douglas A2D Skyshark, shown in a test flight over the California desert. Exhaust exits behind the wing give added thrust. A carrier-berthed plane, it will replace the Skyraider.



## Trailer Boasts Upstairs and Attic

THIS trailer has two stories and an "attic." A double wall over stairs leading to two upper bedrooms forms the storage space. The first floor sports a plastic-tiled kitchen and bath, a 10-foot picture-windowed living room and a master bedroom. The Holan Engineering Co., Elmwood, Ind., sells the 41-foot Ventoura trailer for \$7,400.

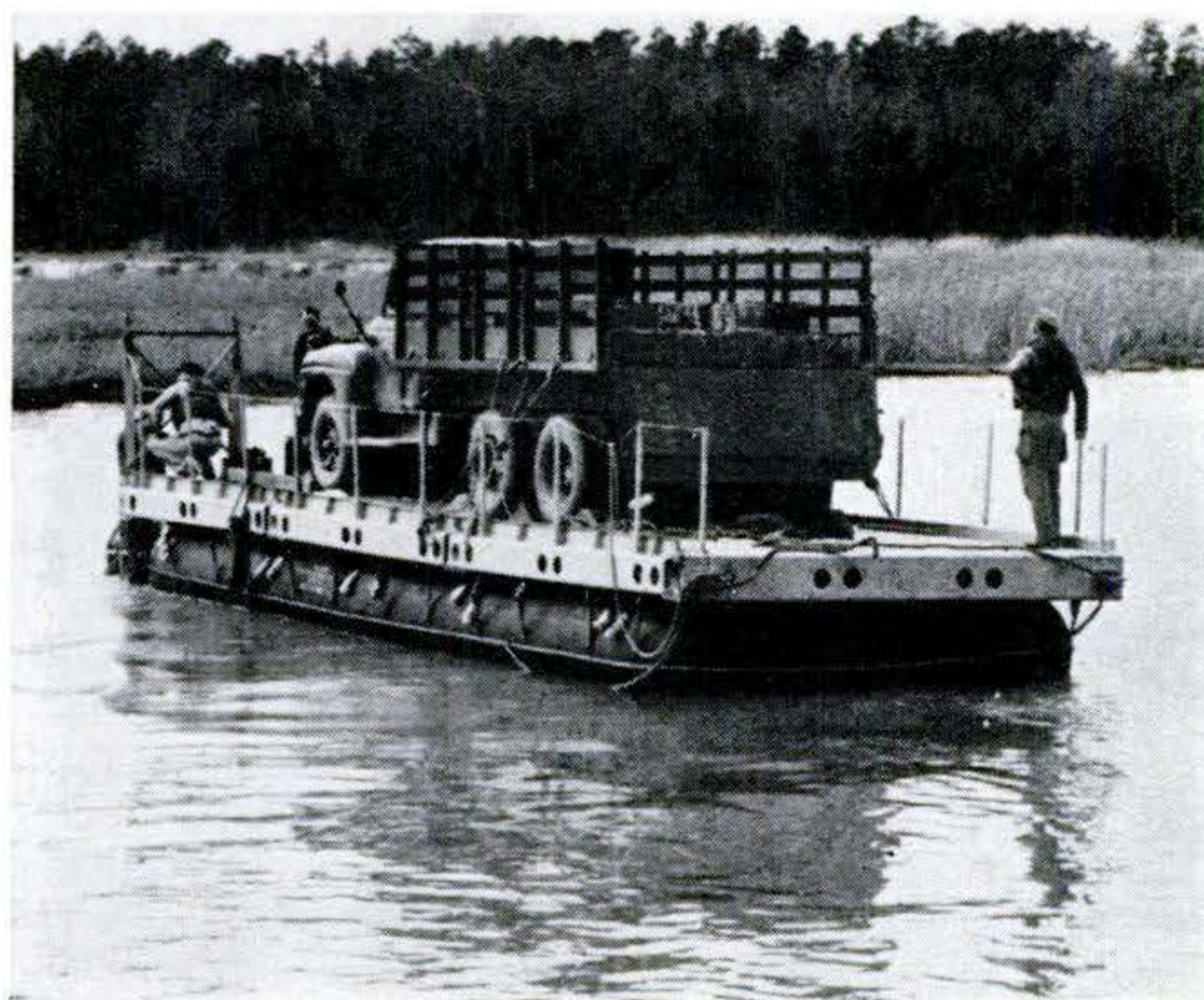




### Swept-Wing Jet Fighter to Take Photos, Too

THE F-84F Thunderjet will soon take on a new job—photo reconnaissance. The new RF-84F version, shown above in test flight, has wing-root air intakes for its turbojets in place of the conventional nose intake. This

leaves the nose free for photographic gear, to be located at flat spots on front and sides. Four machine guns, two in each of the swept wings, will enable the plane to fight its way in and out of enemy territory.



### Portable Barge Folds for Overland Travel

THREE sausage-shaped tubes inflated with air support the aluminum deck of this 36-foot barge. Propelled by two 25-horsepower outboard motors, or towed, it will haul 16 tons of heavy Army equipment. The rubberized-fabric tubes and sectional deck can be packaged for transport by plane from one inland waterway to another. Several of the barges lashed together form a bridge or a dock. Designed by the Seiberling Rubber Co., Akron, the barge is now being tested by the Army Transportation Corps.

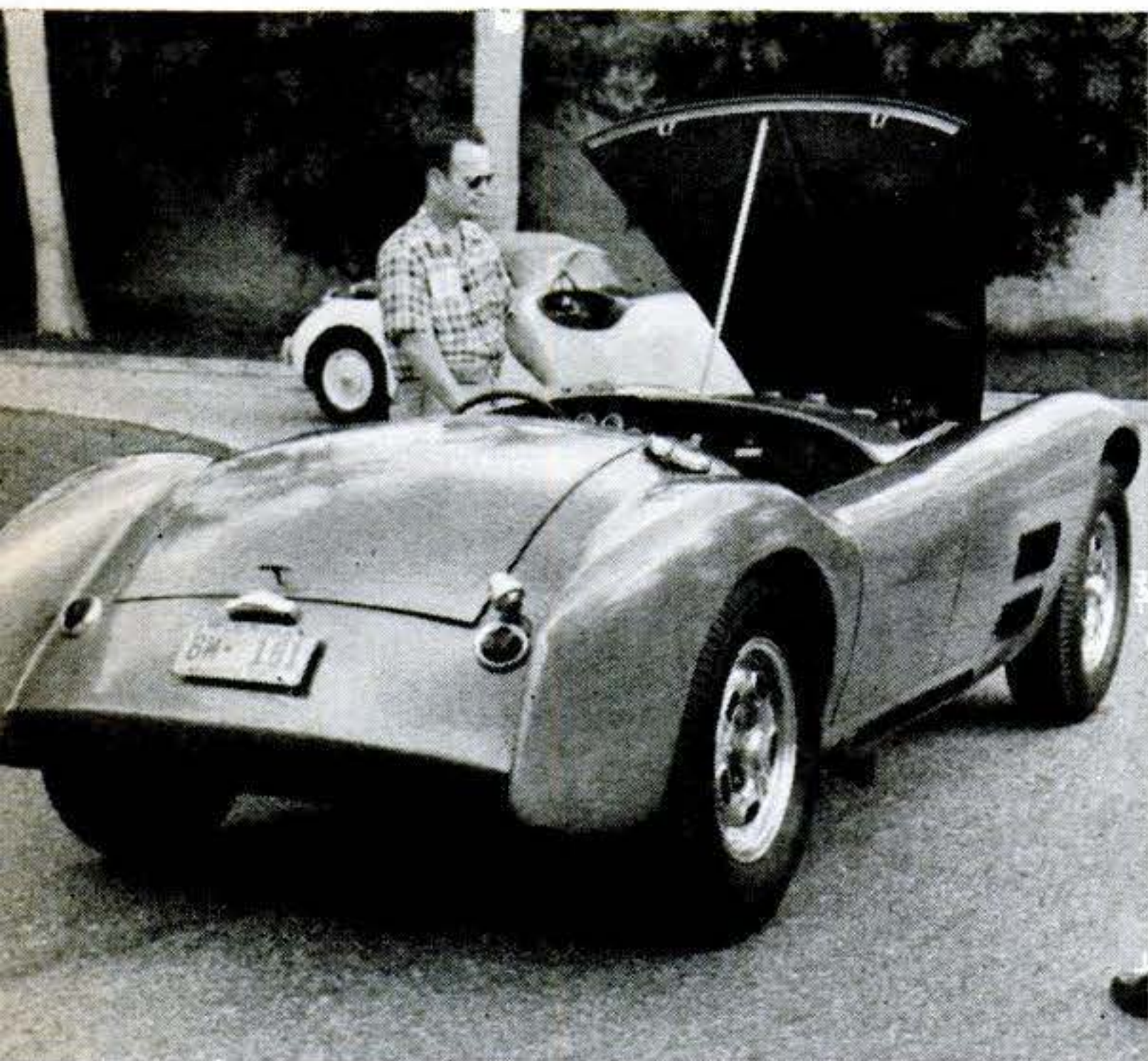
### New Willys Station Wagon Powered by 90-Hp. Aero Engine

THE 90-horsepower F-head six that gives the Willys Aero its punch (PSM, Jan. '52, p. 116) is now under the hood of the company's new station wagon. Other changes include minor styling refinements and a new wrap-around rear bumper that give a longer look although the wheelbase is the same as last year. The station wagon is also available with the four-cylinder Hurricane engine.





**Briggs Cunningham's latest, three hot sportsters with Chrysler V-8s under the hoods, should give the Jags a real race in France this year.**

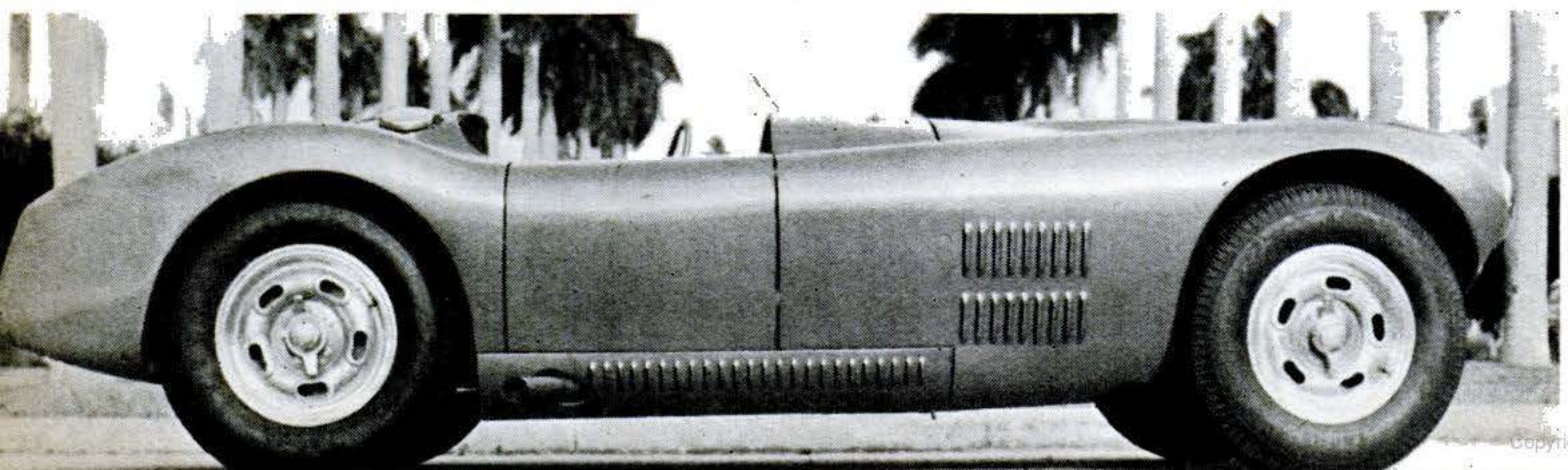


**T**HREE brand-new cars that go like a streak and pivot like a polo pony will carry America's colors in the famous 24-hour road race at Le Mans, France, this month.

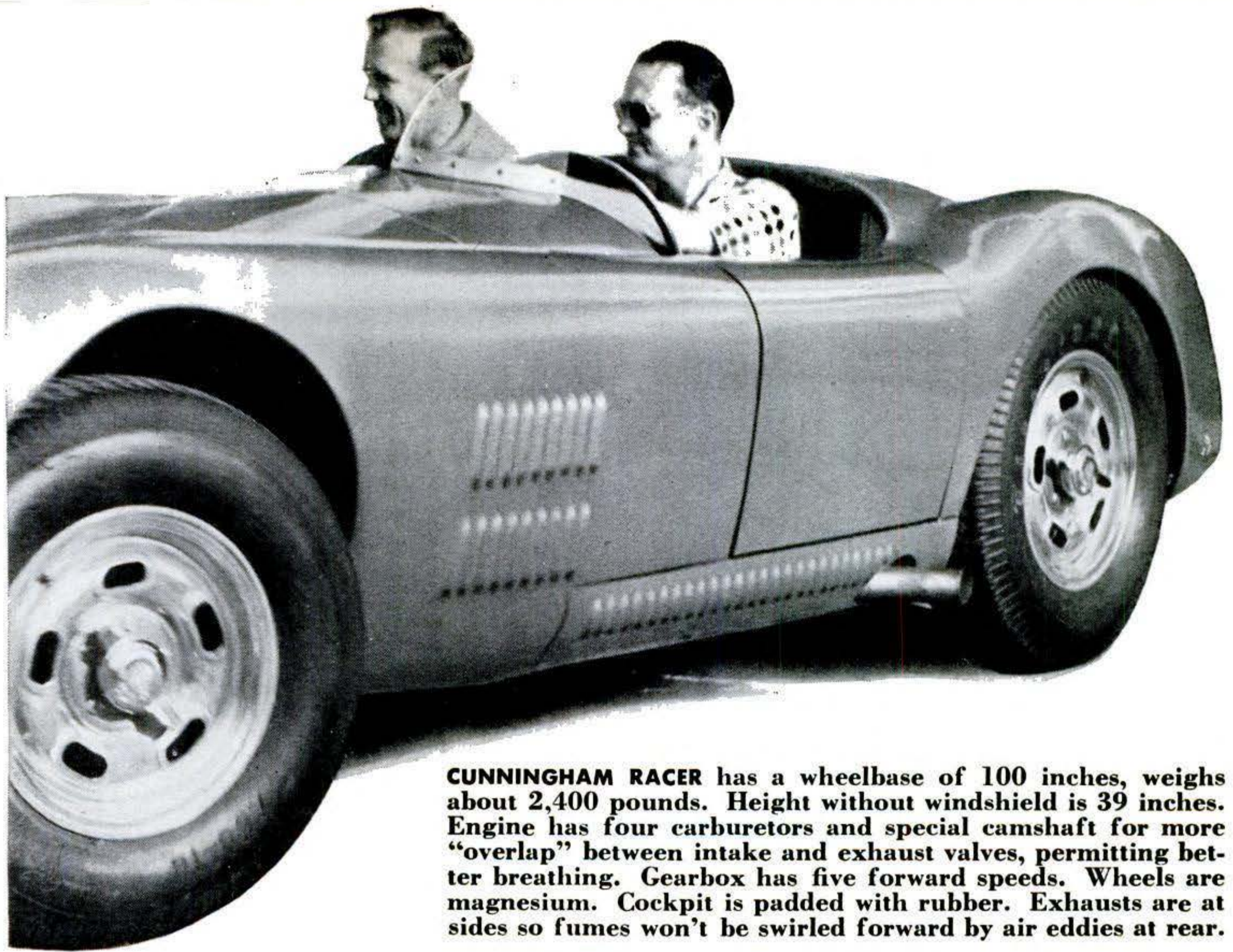
Pictured on these pages is one of them. The other two are exactly like it. Built this spring by Briggs Cunningham of Fairfield, Conn., a monied man with an ambition to win a place for his country in road racing, they are products of some bitter lessons in previous tries against European cars.

Each car has a Chrysler V-8 engine with four carburetors and hemispherical combustion chambers—souped up from 180 horsepower to produce 300 horsepower. Their

**HOOD** (left) is hinged at front so wind won't tug at fastenings. Ground clearance (below) is four inches, over-all length 155 inches.



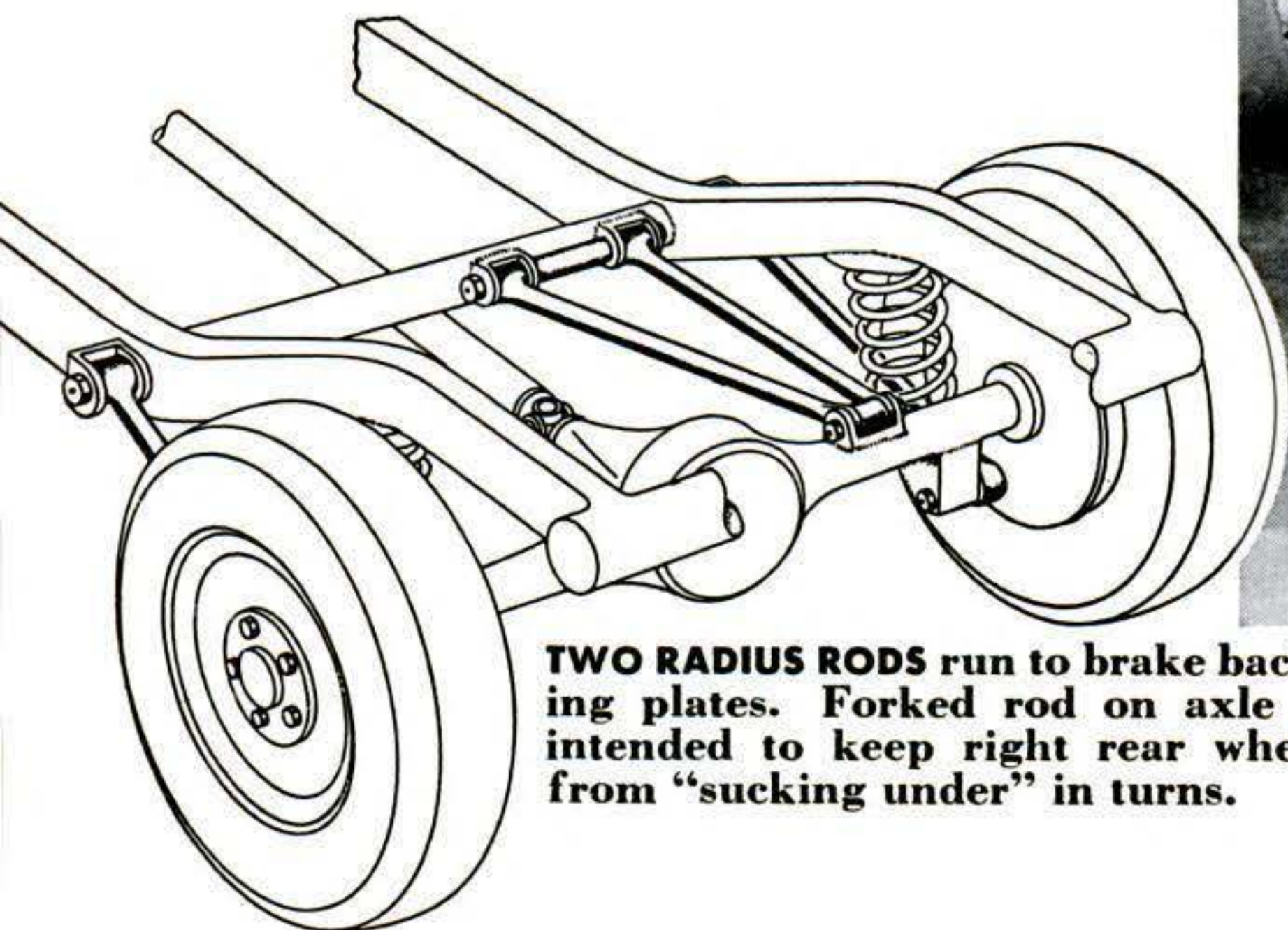




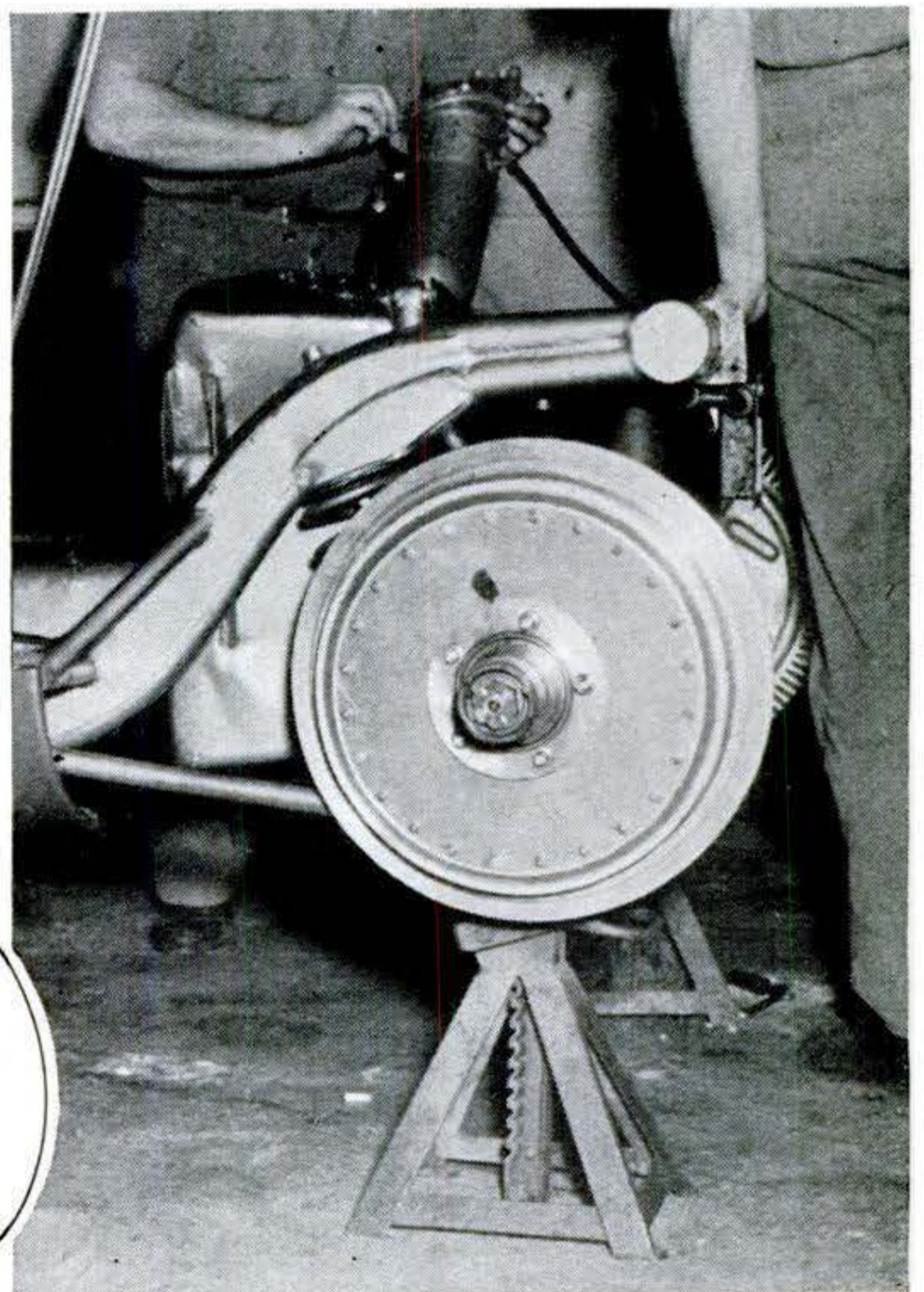
**CUNNINGHAM RACER** has a wheelbase of 100 inches, weighs about 2,400 pounds. Height without windshield is 39 inches. Engine has four carburetors and special camshaft for more "overlap" between intake and exhaust valves, permitting better breathing. Gearbox has five forward speeds. Wheels are magnesium. Cockpit is padded with rubber. Exhausts are at sides so fumes won't be swirled forward by air eddies at rear.

bodies are hand-hammered aluminum. Special rear suspensions are expected to reduce pitching, the fore-and-aft bouncing under hard acceleration and braking.

Two of Cunningham's racing cars, Cadillac-powered, placed tenth and eleventh at Le Mans in 1950. Valve trouble robbed him of second place last year. But he won at Watkins Glen, N. Y., and Elkhart Lake, Wis. He figures it's his turn at Le Mans.



**TWO RADIUS RODS** run to brake backing plates. Forked rod on axle is intended to keep right rear wheel from "sucking under" in turns.



**TWIN STEEL TUBES** welded together form frame. Cunningham has substituted a straight-through axle for independently suspended type.



**ONE TV CAMERA** will concentrate on fresh arrivals in the entrance hall.



**MOBILE TV UNITS** will meet incoming planes and trains and cover events in the streets.

**RADIO BOOTHS**

**THIS FLOOR CAMERA WILL ALWAYS BE KEPT IN RESERVE**

**ZOOMAR LENS** will make any face in the hall look near

**CAMERA PLATFORMS** are 12 to 20 feet high and 12 feet square

**WIRES** from 55 floor mikes run under false floor to control panel on speakers' platform



**TO GET QUICK SHOTS** outside, NBC will use the "walkie-talkie-lookie."



**OUTLET TO THE NATION** will be the microwave tower on top of the Illinois Bell building in Chicago. From here, 30 hours of TV will be telecast from each convention.

ABC

LIBERTY & MUTUAL

POOL

CBS

NBC

CAMERAS ARE ARRANGED TO COVER EVERY INCH OF FLOOR

# How TV Will Take You to Conventions

**One out of two Americans will see a President nominated in Chicago**

**By Gardner Soule**

**S**EVENTY-TWO million Americans will sit in on the greatest town meetings of all time—the Republican and Democratic National Conventions—at Chicago next month. The country's leading TV networks, with 1,000 cameramen, reporters, lighting technicians, writers, editors, film librarians and big-shot commentators on hand, will flash the sights and sounds of the conventions to all but four of the 108 U.S. television stations. Network officials estimate that one out of every two people in the country will see the political conventions on television.

Millions of dollars' worth of new and improved equipment, including the "walkie-talkie-lookie"

that is to be unwrapped for the occasion, will make it possible for TV watchers to pursue a Presidential candidate or a delegate right up to the door of his bathroom, practically the only dependable refuge he'll have from the inquiring gaze of half the nation.

The walkie-talkie-lookie is a portable TV camera and sending station. The outfit, built by RCA, is light enough for one man to carry, though two-man teams may handle the three walkie-talkie-lookies that the National Broadcasting Co. plans to use at Chicago. The camera weighs 10 pounds and is connected by cable to a three-foot-long, 50-pound back pack. The back pack transmits TV images to a nearby station antenna and thence to the country's huge TV audience.

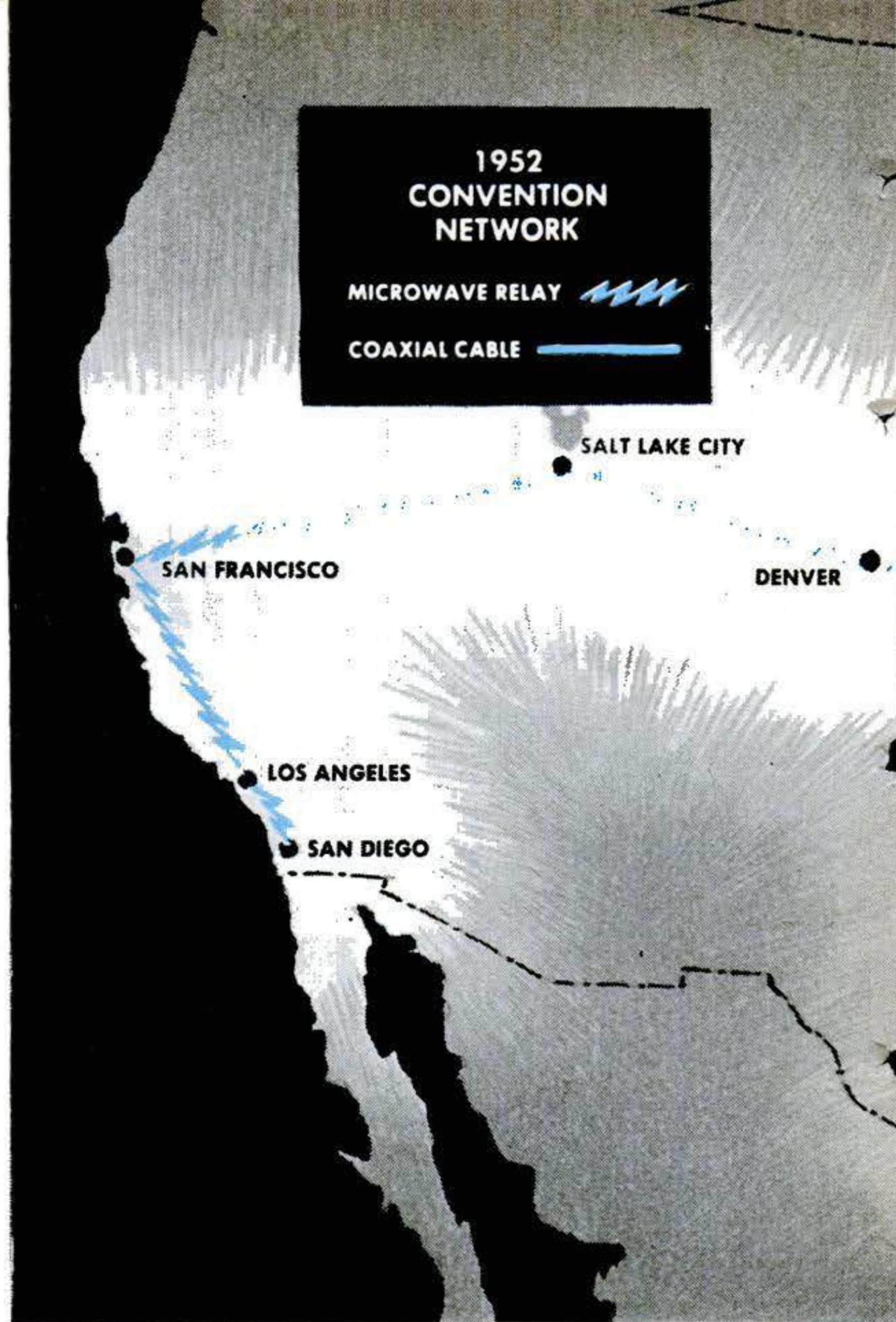
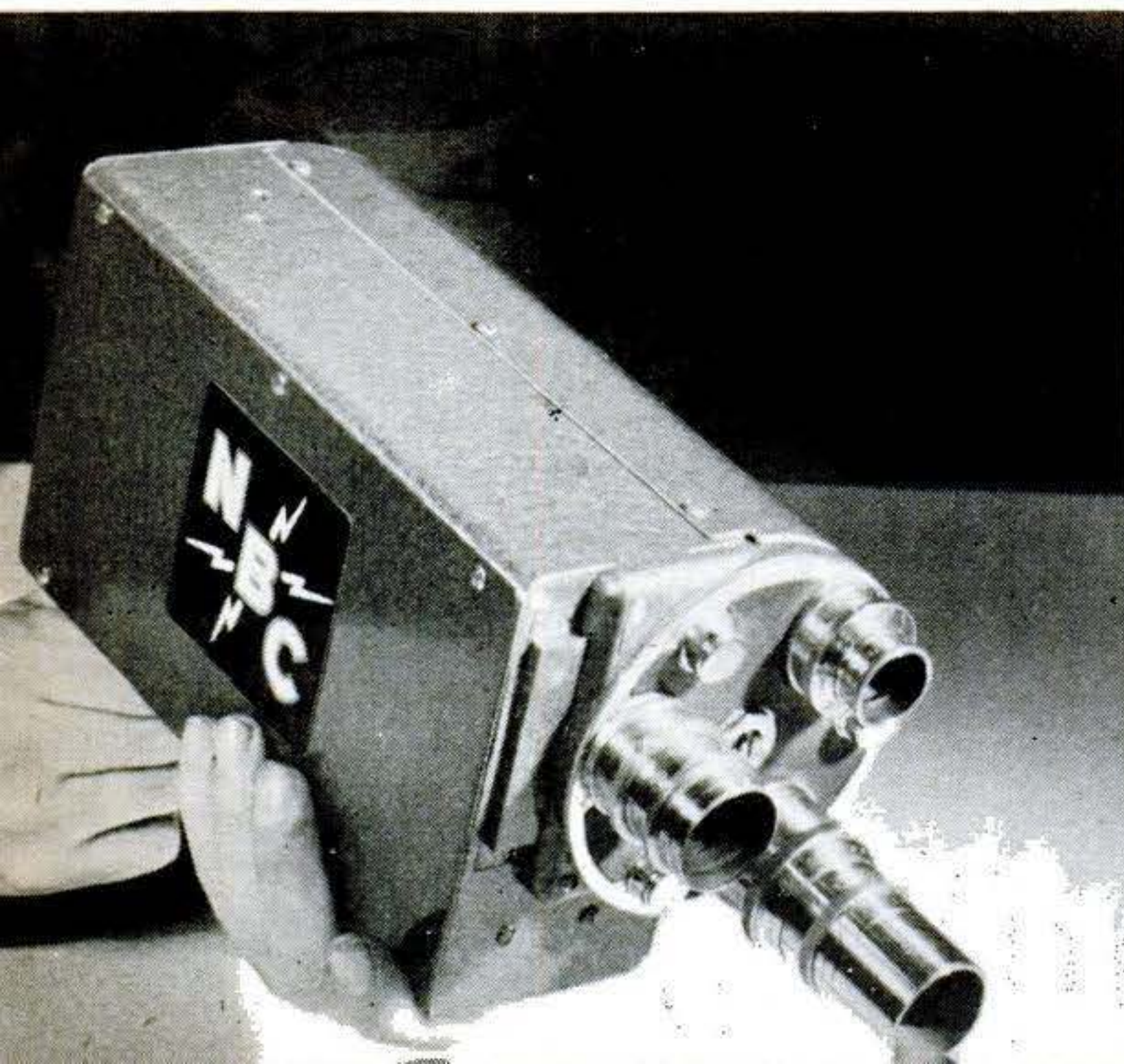
### *Walkie-Talkie-Lookie Goes Anywhere*

The reporter who uses a walkie-talkie-lookie has a choice of three lenses for his camera: a normal, one-inch lens for most close-ups; a wide-angle, half-inch lens for groups and some close-ups; and a telephoto, three-inch lens for bringing distant faces nearer. The lenses are quickly interchangeable.

The walkie-talkie-lookie user can squint through an eyehole in the back of the camera to see what kind of picture he is getting. He picks up sound through a microphone on his wrist or around his neck. He gets instructions by radio and listens to them through a small earphone that looks like a hearing aid.

Because of the complete mobility of his equipment, a reporter with a walkie-talkie-lookie can follow a subject anywhere that

**WALKIE-TALKIE-LOOKIE'S** 10-pound, three-lens camera owes its existence to Vidicon camera tube, only six inches long and one inch wide.

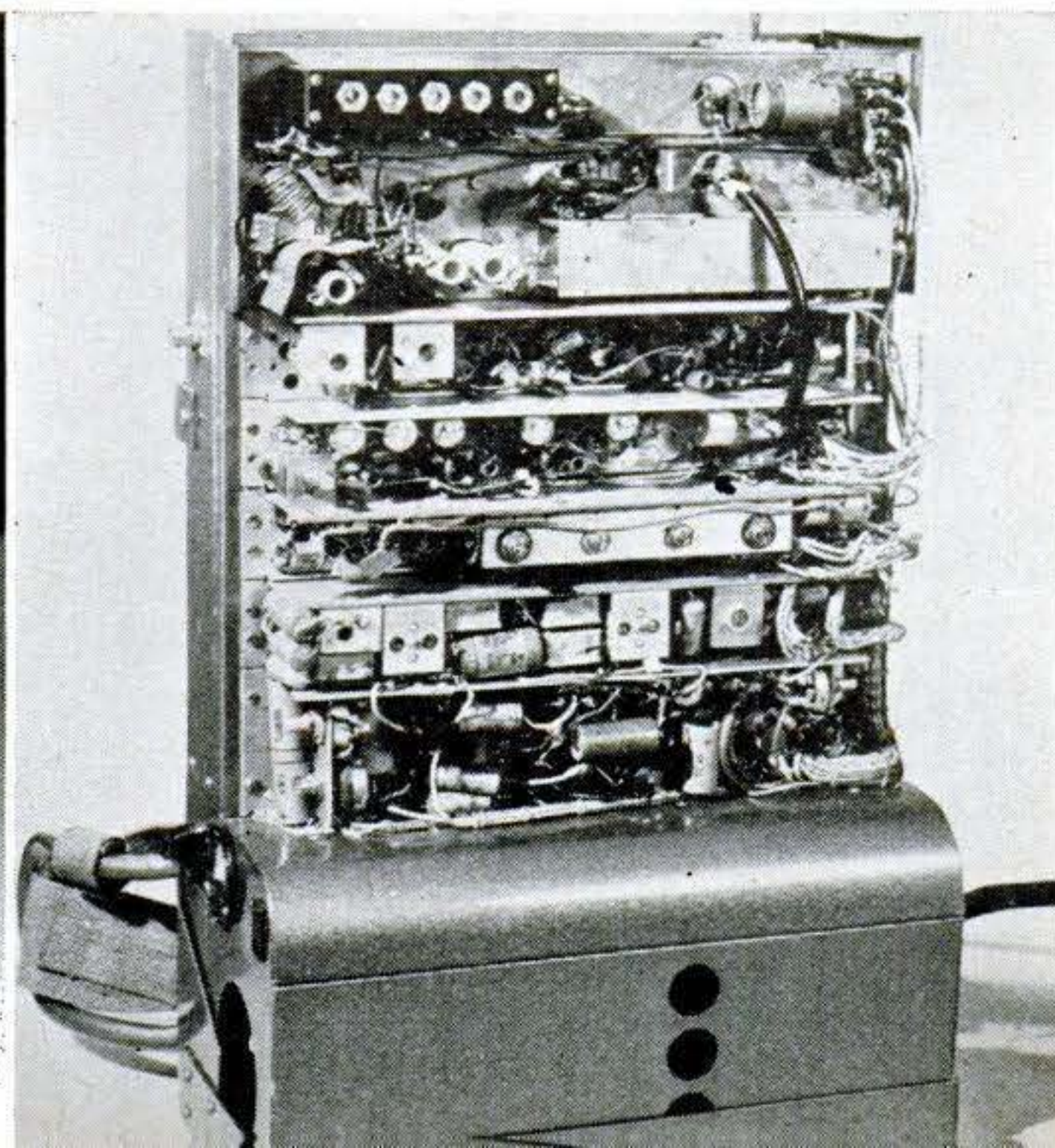


### **Microwave relays and coaxial cables will forge**

the subject is able to go—a thought to chill almost anyone, let alone the average politician.

Another impressive item in the \$1,500,000 worth of equipment that NBC expects to

**INSIDE THE 50-POUND PACK** that the walkie-talkie-lookie cameraman wears is a tight maze of electronic devices for telecasting.





huge 1952 TV chain of 104 stations in 68 cities. For 1948 convention there were but six links.

have at the scene of the conventions is a new truck-mounted mobile unit. The crew of this truck will be able to take movies, develop the film, project the negative into the iconoscope tube of a TV camera (where the image will be turned into a positive) and have a newsreel of an outstanding event on your home screen within an hour of the time it occurred.

Both national political conventions—the Republicans starting on July 7, the Democrats on July 21—will be held in the Chicago International Amphitheatre. This is about the only building in the U.S. large enough to hold all those people and all that TV equipment at one time.

Plans for the TV coverage of the conventions began taking shape last November. By January, workmen were already busy in the Amphitheatre erecting new studios, newsrooms, control rooms, camera platforms. The platforms rise 12 to 20 feet above the floor and will hold the eight TV cameras permitted inside the convention hall. Because

the number of cameras inside the Amphitheatre is strictly limited, all networks will share those eight. Six of them will be running at all times during sessions, so as not to miss a thing of interest either on the floor or in the entrance hallway.

#### *55 Mikes to Be Set Up*

All eight cameras will be equipped with Zoomar lenses (PSM, Aug. '47, p. 126). The Zoomar is a 2½-foot-long adjustable lens that can be changed between wide angle and telephoto while a shot is being made. To the TV audience, the camera seems to zoom in for a close-up or back away for a long view, yet actually it never moves from its position. This lens will make it much easier to get close-ups in the convention hall, for cameras will not be permitted to move around on the crowded floor.

To make certain that no speeches and not many delegate confabs escape the ears of the 72,000,000 people expected to be watching the nation's 18,000,000 TV screens dur-



**CONVENTION HALL**, Chicago's famous International Amphitheatre, seats 12,000 people,

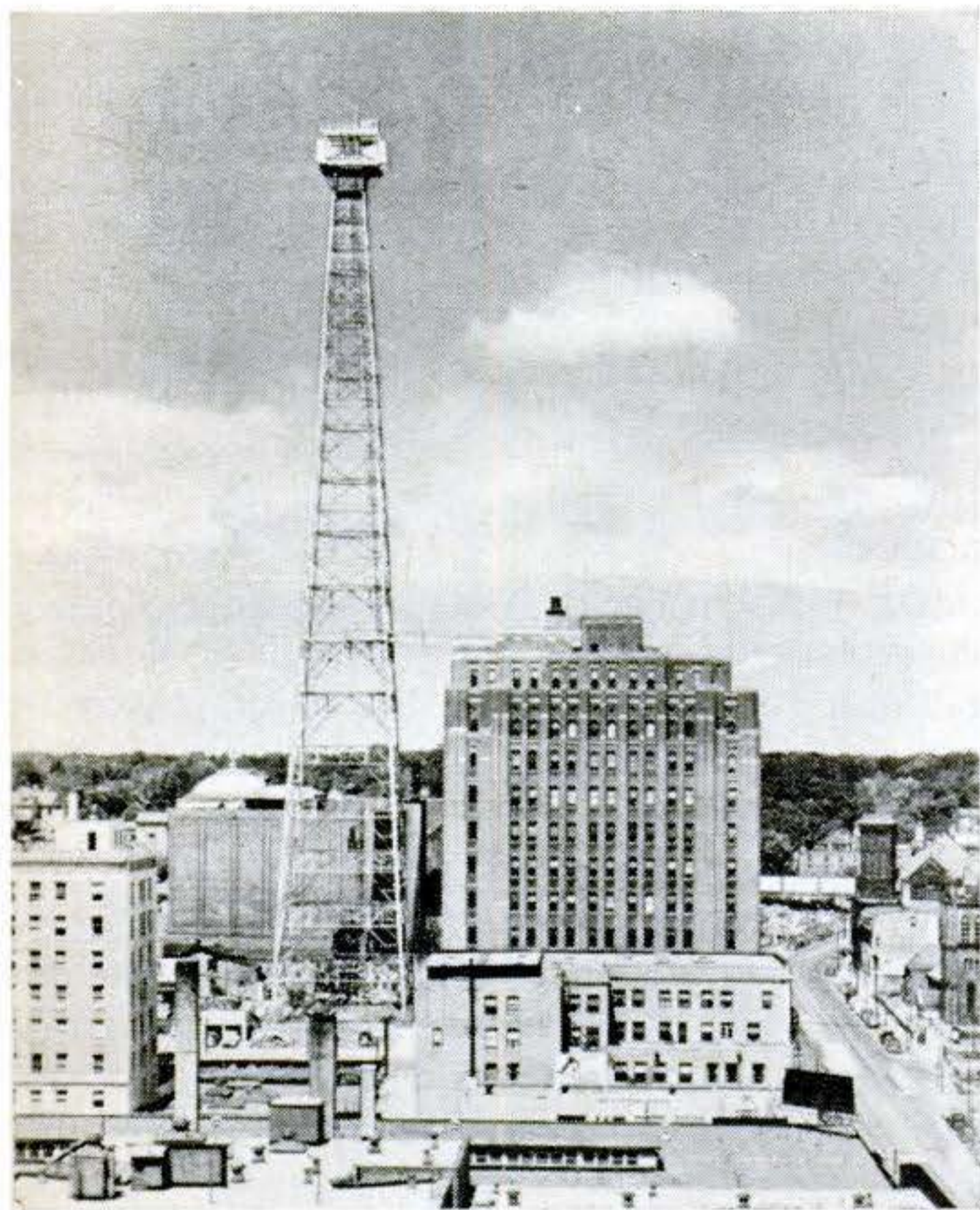
but most of the TV staff of 1,000 and their equipment will occupy a space 150 by 250 feet.

ing the big July events, 55 microphones are being installed on the floor of the Amphitheatre. Wires from the bases of these mikes run under a false floor, installed for the occasion, to a push-button panel on the speaker's platform at the front of the hall. An engineer seated at this panel will be able to turn on any one of the floor mikes he chooses.

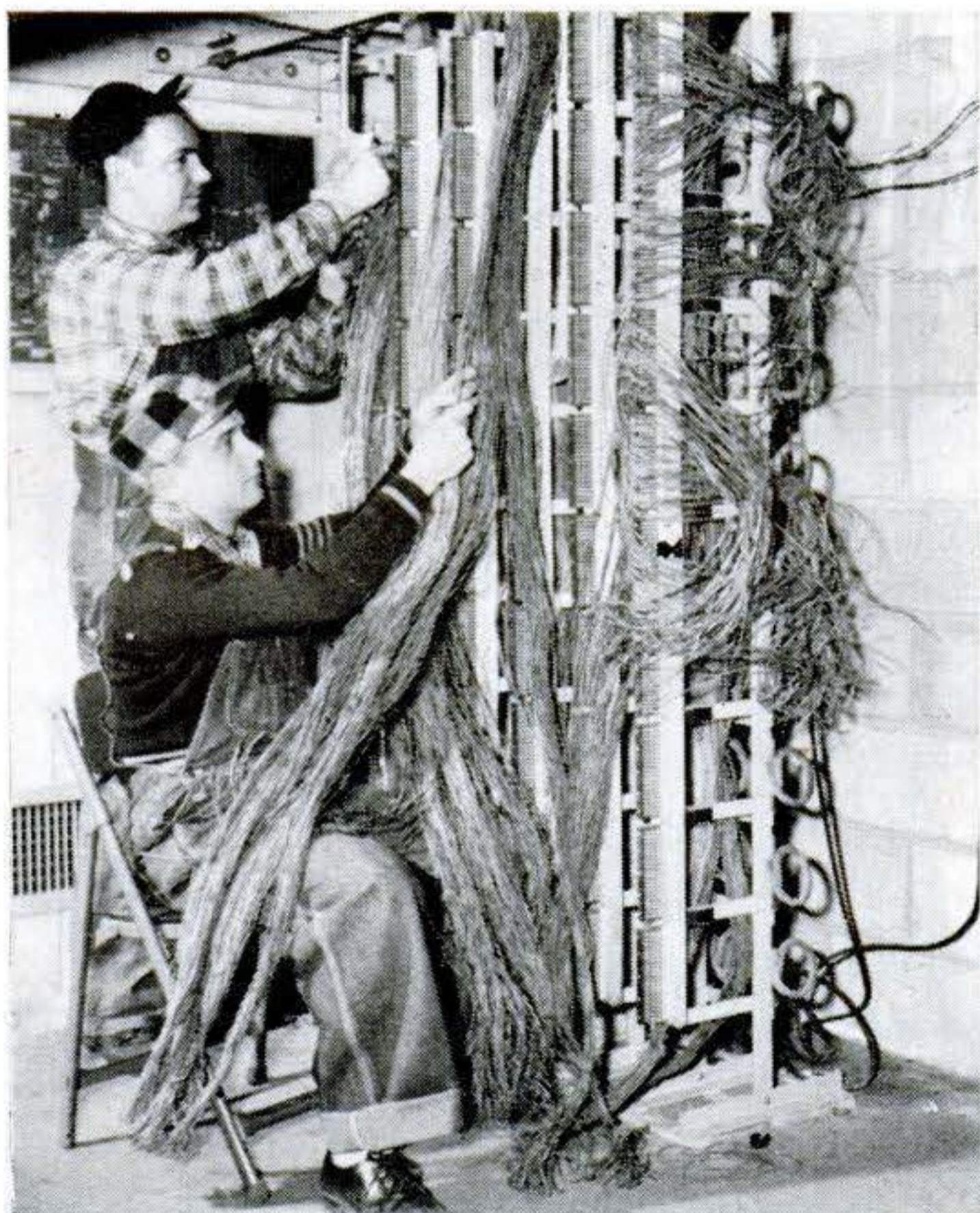
For its own network, the Columbia Broadcasting System plans to improve upon even this broad coverage of convention sounds by sending men with walkie-talkie radios onto the floor to pick up whatever seems interesting to them. The walkie-talkies will

broadcast it to a receiver off the floor, from where it may be sent out to the entire CBS network. Sound obtained in this way can be used for both radio and TV.

Out on the streets, in hotel lobbies, at railroad stations and airports, even in the traditional smoke-filled conference rooms where the most vital decisions have at times been made, the TV networks and independent stations will have other staff men at work. They have assigned dozens of cameramen to take movies on both 35-mm. and 16-mm. film. Some of these films will be telecast promptly over the networks. Others will go by plane or fast train to the four



**TALLEST TOWER** in the cross-country microwave-relay system that will carry TV convention programs to the audience west of Chicago is this lofty structure in Des Moines.



**TELEPHONES** enough for two small cities are being installed in Convention Hall for the use of TV, radio and newspaper men. Cable splicers are shown preparing for July's traffic.

U. S. stations—Newark, N. J., Albuquerque, Phoenix and Seattle—not on networks and to TV stations in foreign countries.

Some TV stations are planning to take special movies of the delegations from their own localities and bring them home by plane or train each night for telecasting.

### **Mobile Units Coming**

Another photographic innovation—the Polaroid Land camera, which takes a picture and develops a positive in a minute or two—may see convention use. NBC counts on shooting still pictures with it in the smoke-filled rooms, provided the photographers are allowed to enter.

Twelve mobile TV units, including trucks from New York, Washington and the West Coast, are also rolling toward Chicago this month, like fire engines converging on a five-alarm fire.

Altogether this enormous mobilization of TV technicians and equipment, which is to be tested July 4 or 5, will provide a total of 60 hours of television programs—30 during each convention.

Westinghouse, Philco and Admiral are footing the bill, which is known to total several million dollars—not unreasonable considering the size of the audience.

“I don’t think the politicians realize that they’re playing with dynamite,” said William McAndrew, who is in charge of NBC’s TV convention coverage. “But that’s just what they’re doing!”

McAndrew had a vivid demonstration of how seriously the TV audience takes its political programs. He once cut Senator Kefauver off the air, at the senator’s request, in Washington. “The reaction would scare you,” said McAndrew. “We got 350 phone calls within five minutes.”

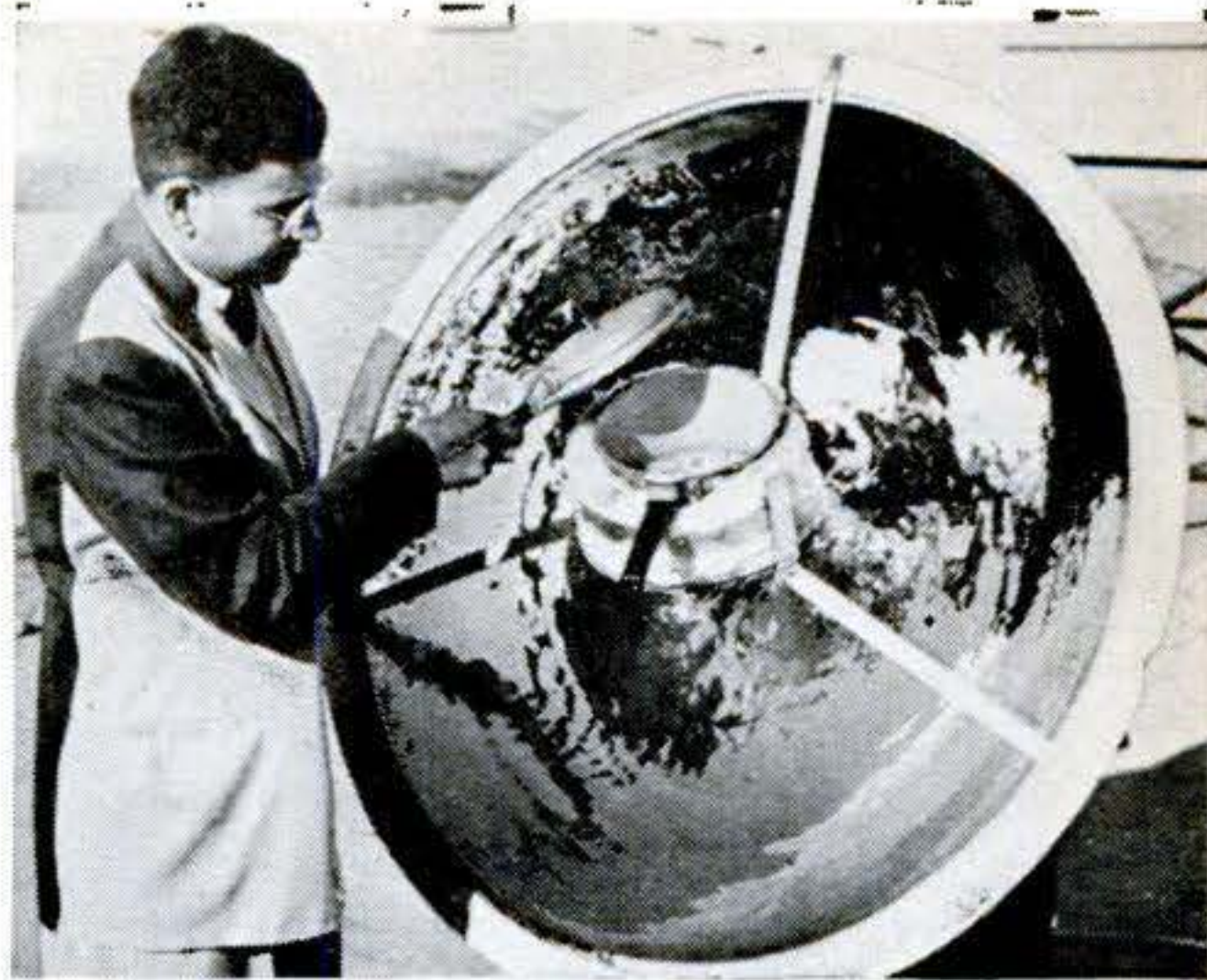
### **Will TV Help Self-Government?**

If, as many experts predict, this intimate acquaintanceship of a concerned audience with the candidates results in more thoughtful voting and better selection of public men, television may prove to be one of the greatest aids to self-government ever developed.

“TV,” McAndrew said, “has a peculiar knack of showing up a politician’s bad qualities as well as his good ones. TV will, in short, show the candidates as they really are.

“The viewer will either think a party in convention is businesslike and efficient or he will think it is a bunch of clowns and he’ll vote the other way.”

END



### **Sun’s Heat Cooks Meals**

INDIA’S plentiful supply of sunshine has been put to work in the home by a scientist of the National Physics Laboratory at New Delhi. He now cooks with it, having devised a solar heater (above). The heater is a four-foot polished metal reflector that concentrates the sun’s heat on the base of a pressure cooker. He hopes to mass-produce the solar-heating apparatus for about \$10.



### **Bike Rack Speeds Deliveries**

TIRED of wrestling with the problem of carrying freshly cleaned and pressed clothes over one arm, Luis Cosmo Gonzales, Puerto Rican delivery boy, has rigged up a rack for the rear of his bicycle. It carries eight or 10 garments, individually wrapped, without wrinkling. It works best in a tail wind.



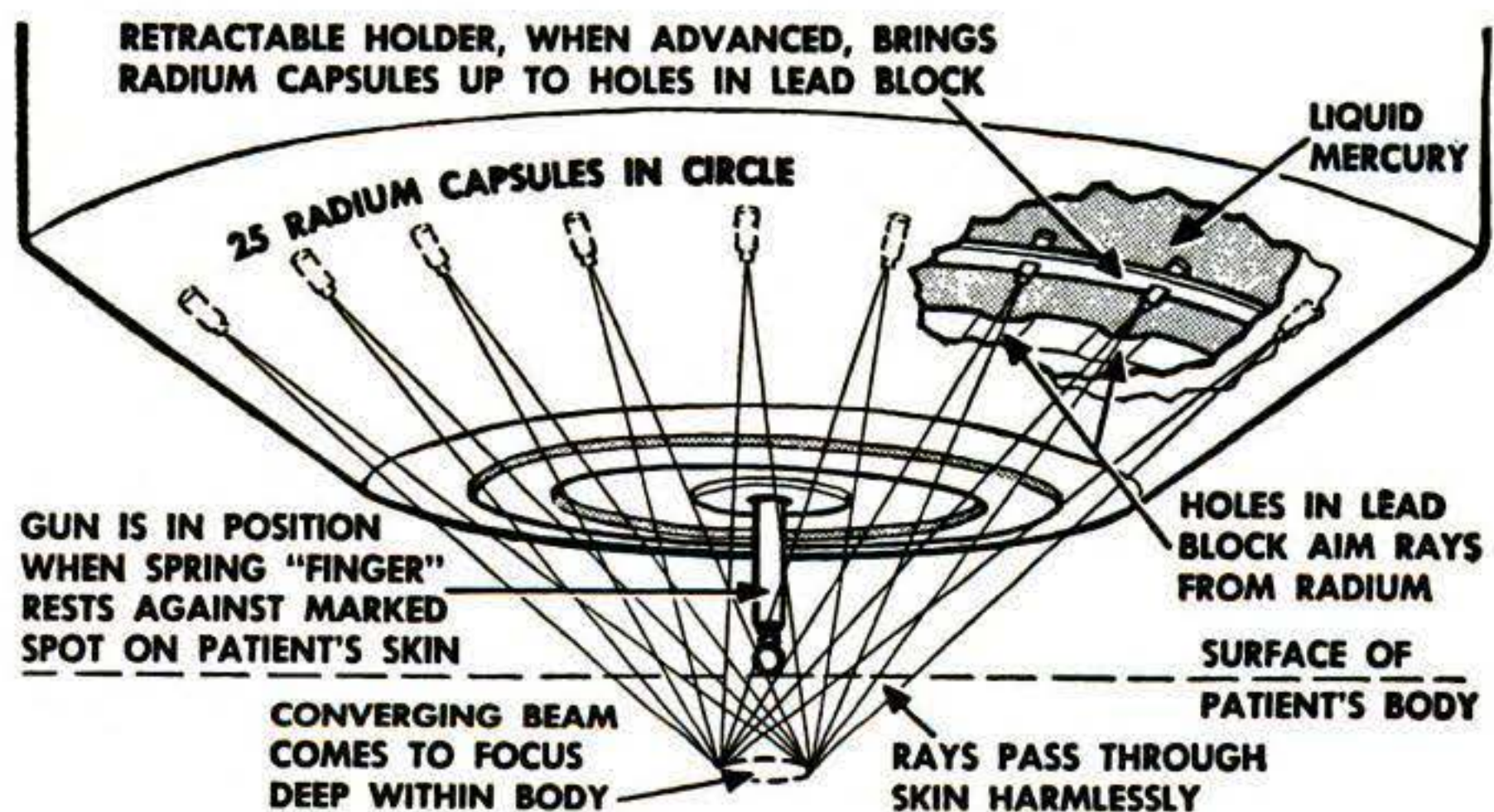
LOCATION OF RADIUM



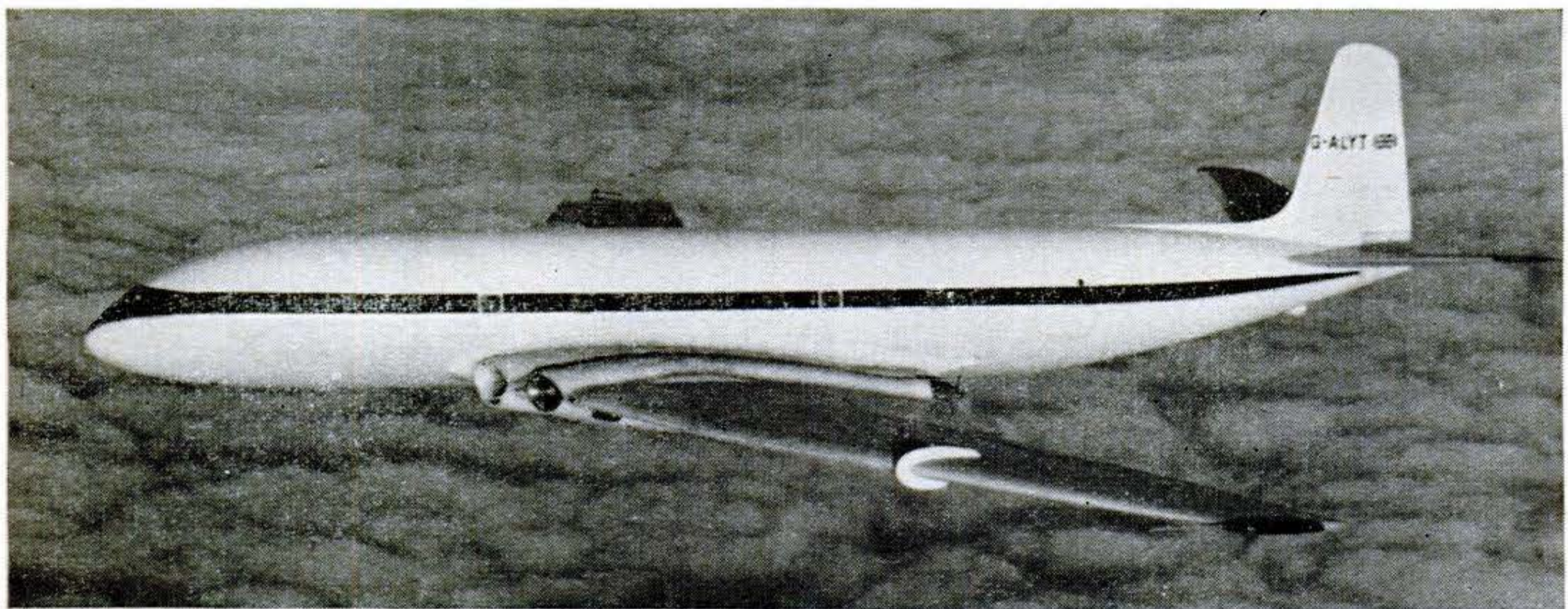
**FIVE-TON GUN** at left holds  $1\frac{2}{3}$  ounces of radium in Monel-metal capsules (above). Diagram below shows how gun focuses rays.

## Mighty Radium Gun Helps Fight Cancer

THE nation's mightiest radium gun now aids cancer patients at Roosevelt Hospital in New York. Just completed, it wields a converging beam of gamma rays from a ring of 25 capsules containing a total of  $1\frac{2}{3}$  ounces of radium—that's about \$1,000,000 worth. A unique design, devised by Dr. G. Failla (PS, Mar. '51, p. 131), concentrates the rays about four inches inside a patient's body, some nine inches from the gun itself, to treat a deep-lying tumor. Because the powerful beam reaches full intensity only at that depth, it passes through other tissues



without harming them. A motor-driven, remotely controlled holder advances or retracts the radium capsules within a tankful of liquid mercury that acts as shielding, turning the beam on or off at will.



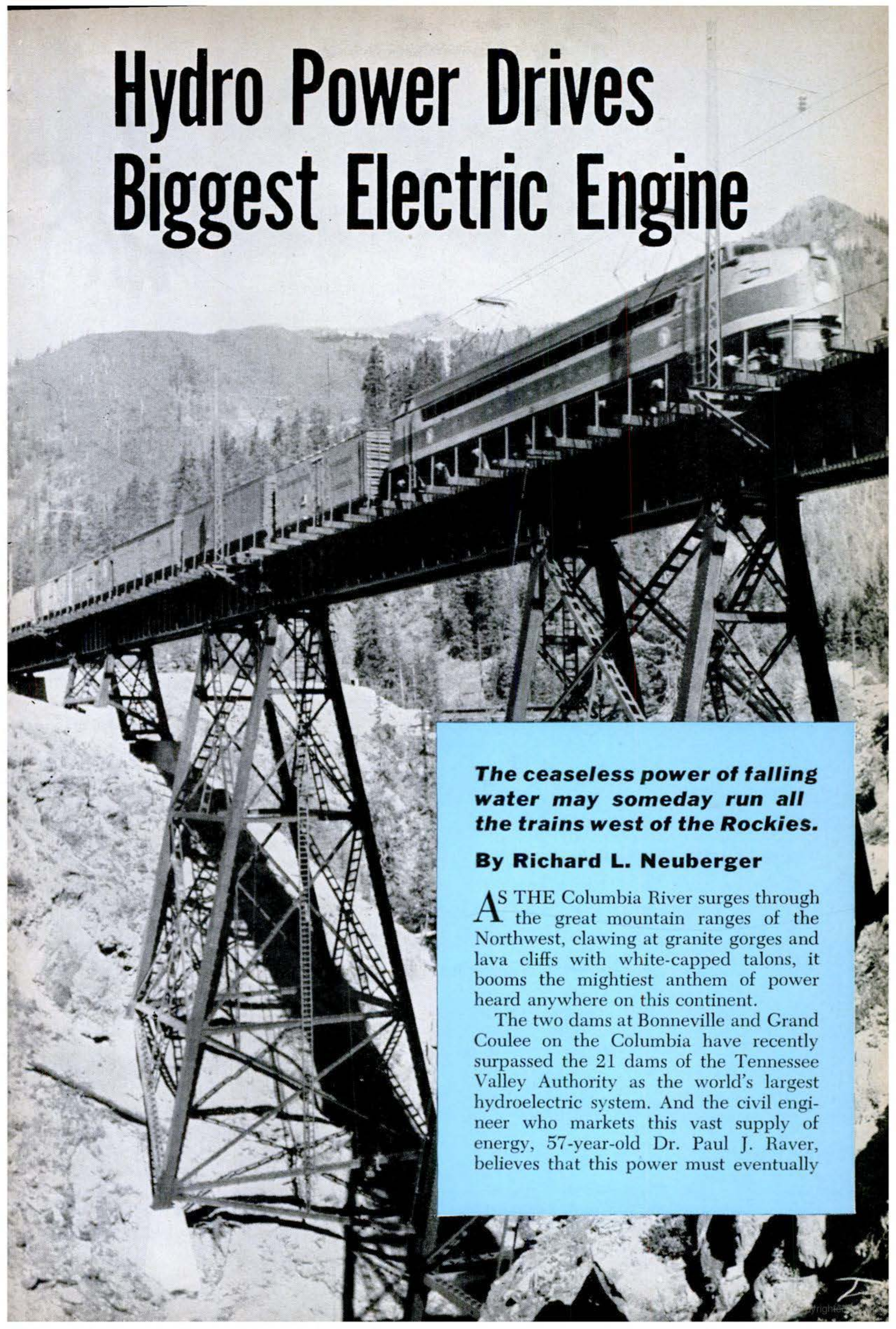
## Comet Gets Stronger Engines

THIS new model of Britain's de Havilland Comet, world's first jet airliner, has almost a third more power than the Comet 1. Called the Comet 2 and propelled by four

Rolls-Royce Avon engines, it is designed to carry 44 passengers on transocean runs. Comet 1 began service last month. It can fly from London to Cairo—nearly as far as New York to San Francisco—in  $5\frac{1}{2}$  hours.



# Hydro Power Drives Biggest Electric Engine



***The ceaseless power of falling water may someday run all the trains west of the Rockies.***

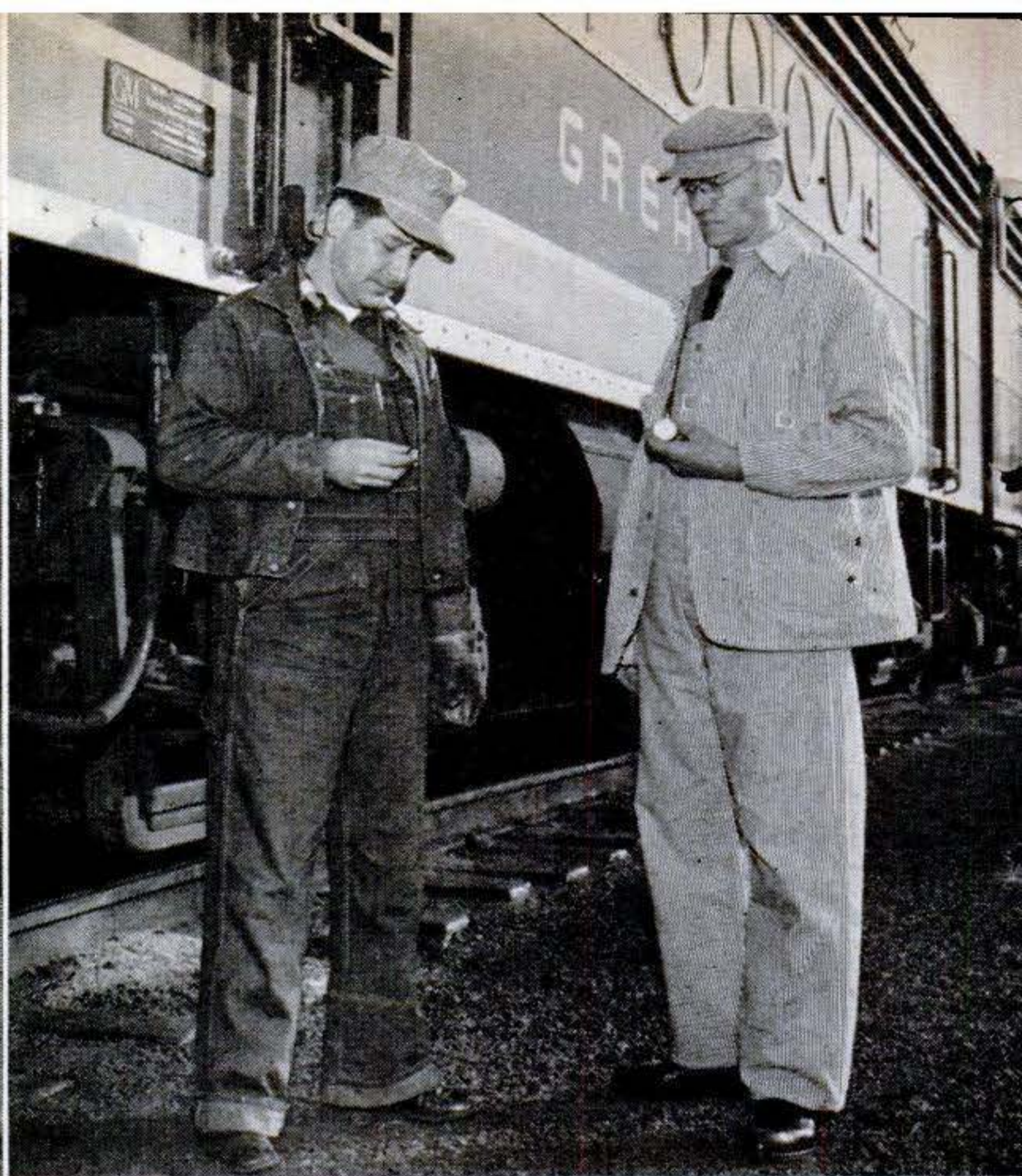
**By Richard L. Neuberger**

AS THE Columbia River surges through the great mountain ranges of the Northwest, clawing at granite gorges and lava cliffs with white-capped talons, it booms the mightiest anthem of power heard anywhere on this continent.

The two dams at Bonneville and Grand Coulee on the Columbia have recently surpassed the 21 dams of the Tennessee Valley Authority as the world's largest hydroelectric system. And the civil engineer who markets this vast supply of energy, 57-year-old Dr. Paul J. Raver, believes that this power must eventually



**WORLD'S LARGEST** single-cab electric locomotive hauls as much tonnage for the Great Northern as a four-unit Diesel. Man in foreground is Joe Gaynor, GN's electric boss.



**ENGINEER AL STRANDRUD** (right) checks time with fireman Joe Cochrane before 85-mile run from Seattle to Skykomish, where they will swap this Diesel for big "white-coaler" at left.

be used to move all main-line railroad trains running west of the Continental Divide.

Within the next few years the McNary and Chief Joseph Dams will be completed. In addition, the highest dam ever built is planned for the Columbia's principal tributary, the foaming Snake River. It will be wedged into the 6,000-foot abyss of Hell's Canyon, a deeper chasm than even the Grand Canyon of the Colorado.

#### *How to Save 300 Million Gallons of Oil*

"All this energy," Dr. Raver points out, "comes from a resource which will never run out—falling water. Why not protect our precious oil reserves that are in real danger of depletion? Trains are the only type of transportation which can be hooked to a far-off central station for their fuel. At least 300 million gallons of petroleum could be saved annually if the transcontinental railroads operating on the coast side of the Rocky Mountains were put under trolley wires."

But how would electric engines perform on the stubborn grades that characterize railroading in the West? There could be no better place to find out than in the cab of the biggest electric engine ever built, No. 5018, or its identical twin, No. 5019, which the Great Northern Railway is using to haul

both freight and heavy passenger trains over the Cascade Range for 75 miles between Skykomish and Wenatchee in the state of Washington.

As the Great Northern's crack Empire Builder rolled in one evening under the heavy copper trolley wires at Skykomish, engineer Al Strandrud brought his two-unit Diesel engine to a gentle halt. He fumbled for a battered valise at his feet and then clambered to the ground. With fireman Joe Cochrane close behind, he dogtrotted silently over gravel ballast to where a massive bulk stood in the gathering dusk.

I followed Joe Gaynor, the Great Northern's superintendent of electrical operations, up the metal steps into the cab.

#### *Aboard the World's Biggest Electric*

Strandrud seemed a bit short of breath as he slipped into the leather seat of the world's largest single-cab electric locomotive. At the age of 67, a man couldn't quite change engines like a pony-express rider swapping steeds. But Strandrud said he didn't mind the quick shunt between Diesel and electric. Indeed, he thought it was a real distinction to handle one of the few train runs in the United States where the same crew operated two types of motive power on a single shift.

Eighty-five miles out of Seattle, Strandrud and his fireman were abandoning a twin-unit Diesel-electric for a locomotive which got its energy not from a power plant aboard the train but from that apparently harmless wire suspended 26 feet above the roadbed by sturdy cedar poles.

Hostlers had taken the Diesel off the long luxury limited. Strandrud moved the controller and the electric clicked onto the main line. Without a perceptible bump the 101-foot engine eased against the lead mail car. Couplers were fastened. The air was tested. Lanterns swung like fireflies on the station platform. A bell below the locomotive frame began to ring. The Empire Builder eased eastward through the Skykomish yards as the red and green switch lights slowly disappeared behind us. Our whistle gave a stentorian blast for a grade crossing. The labyrinth of rails funneled into one track,

and over that track we were trundling with increasing speed. Fir trees on either side of the right of way formed a corridor for the shimmering rails. We could hear an occasional roar of rapids above the noise of the locomotive.

#### *Mountains Make It Tough for Trains*

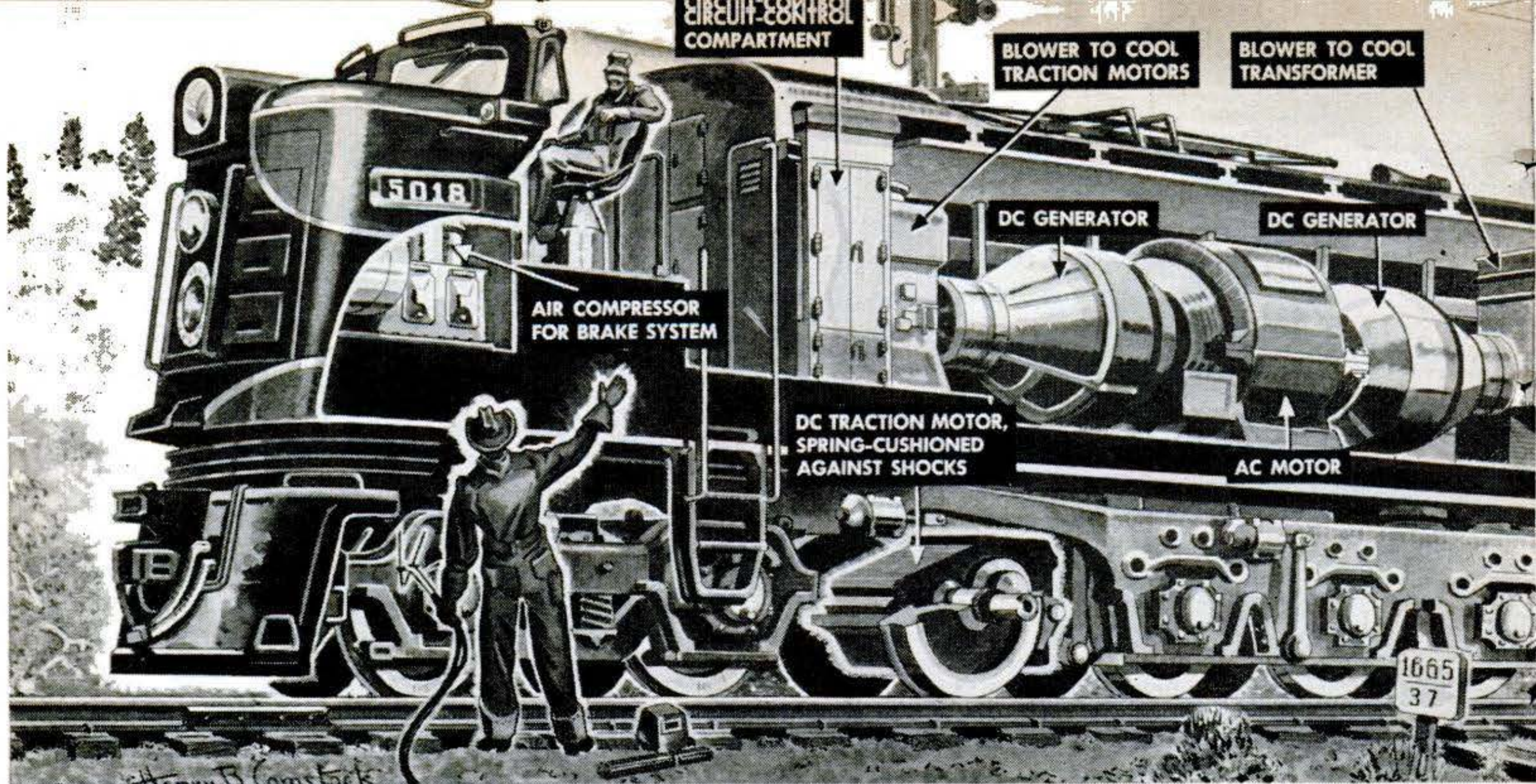
The hills stiffened into cliffs and we were in a winding canyon. A tilt to the cab floor told us that a heavy grade had challenged the train. The fireman confirmed that it was 2.2 percent—"steepest on the system." The engineer had opened the controller five or six more notches. We did not slacken speed.

To the motorist with an automobile weighing 3,500 pounds a grade of 2.2 percent barely requires a few more drops of gas. It means that for every 100 feet of distance there is a vertical rise of 2.2 feet. But some trains weigh 5,000 tons, or 10



**THIS IS GRAND COULEE**, biggest concrete dam ever constructed. With Bonneville Dam, also

on the Columbia River, it comprises the greatest hydroelectric power system in the world.



**DIRECT-CURRENT DRIVE** is ideally suited to steep Cascade Mountain grades. To produce it, the world's largest electric reduces 11,000-volt

million pounds. Getting such tremendous tonnages over the high mountains of the Far West has been the thorniest problem in American railroading for the past three-quarters of a century.

#### *Too Much Speed Spills the Soup*

"This engine could do 45 miles an hour here with this train, but our regular speed on these curves is 30," volunteered Strandrud. "Remember, it's about dinner time and those folks back there in the diner are just ordering their meals. I'd feel real bad if I spilled soup or coffee on a lady's nice clean dress."

In the muffled atmosphere of the cab I had forgotten about the 330 passengers who rode at our rear. Now I thought of the brightly lighted dining car with its gleaming silver service and damask table linen. How vivid a contrast that seemed to this shadowy little steel cubicle, with its illuminated instrument panel, where the pace and safety of the train were at stake.

We slowed for a frame station building. In the wilderness night the headlight of No. 5018 picked out a trim figure in woolen winter sports clothes on the platform. It also lit up the picturesque name of the station: Scenic.

"Too bad this train never stops here," grinned the fireman. "That's Barbara, our ski-demon telegraph operator. She's 21, blond and single."

The station called Scenic guards the west-

trolley-fed AC by means of a transformer and passes it through AC motors. These motors drive DC generators whose output goes to the

ern portal to North America's longest tunnel, and we looked into the black cavity which yawned ahead of us. This was Cascade Tunnel, 7.8 costly miles in length. By burrowing beneath the range it had cut off eight miles of switchbacks and snowsheds on the crest of the Cascades. Electrical operation had been recommended to eliminate engine smoke in the long bore.

I could see that the trolley wire dipped down six or seven feet to fit inside the casing of the approaching tunnel. I braced myself and wondered what would happen to the pantographs, those diamond-shaped frameworks of metal which picked up juice overhead.

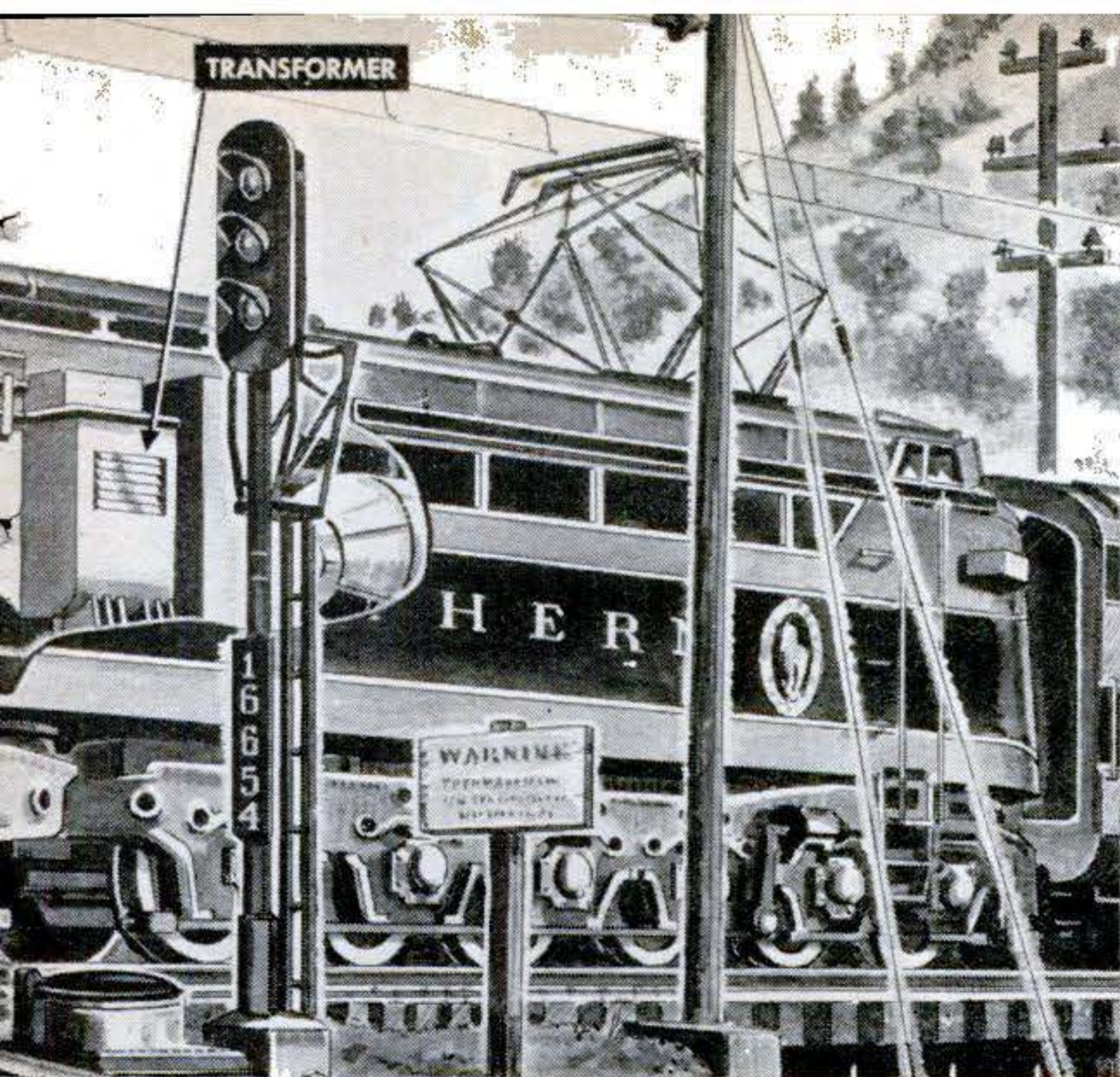
"Our trolleys ride on sensitive springs," explained Joe Gaynor, as if he had guessed my thoughts. "A zephyr could practically blow them lower."

#### *Like Riding in the New York Subway*

I observed that the engineer had to add several brackets on his 39-notch controller to hold the train at its prevailing speed. Gaynor explained that air resistance in the tunnel required at least seven percent more power from a locomotive. It was like riding at the front of a New York subway train, except that we were beneath a granite mountain instead of a metropolis of brick and steel. We traversed Cascade Tunnel in 17 minutes and burst forth into the starlit night.

"The summit!" exclaimed Gaynor.

Now we were on a downhill slant. Strand-



traction motors that drive the wheels. To produce regenerative braking, the AC-DC conversion process is reversed.

rud shut off the controller. Then he opened up a smaller second throttle at his left. Once more he applied the power. The engine was in regeneration. The smaller throttle was the field lever, which converted the traction motors of the huge General Electric locomotive into generators.

#### *Saving \$135,000 on the Electric Bill*

As generators, they were putting juice back into the overhead wire, with the pantograph as the conductor. The weight of the

long passenger train, gliding down the 2.2-percent grade, provided the energy.

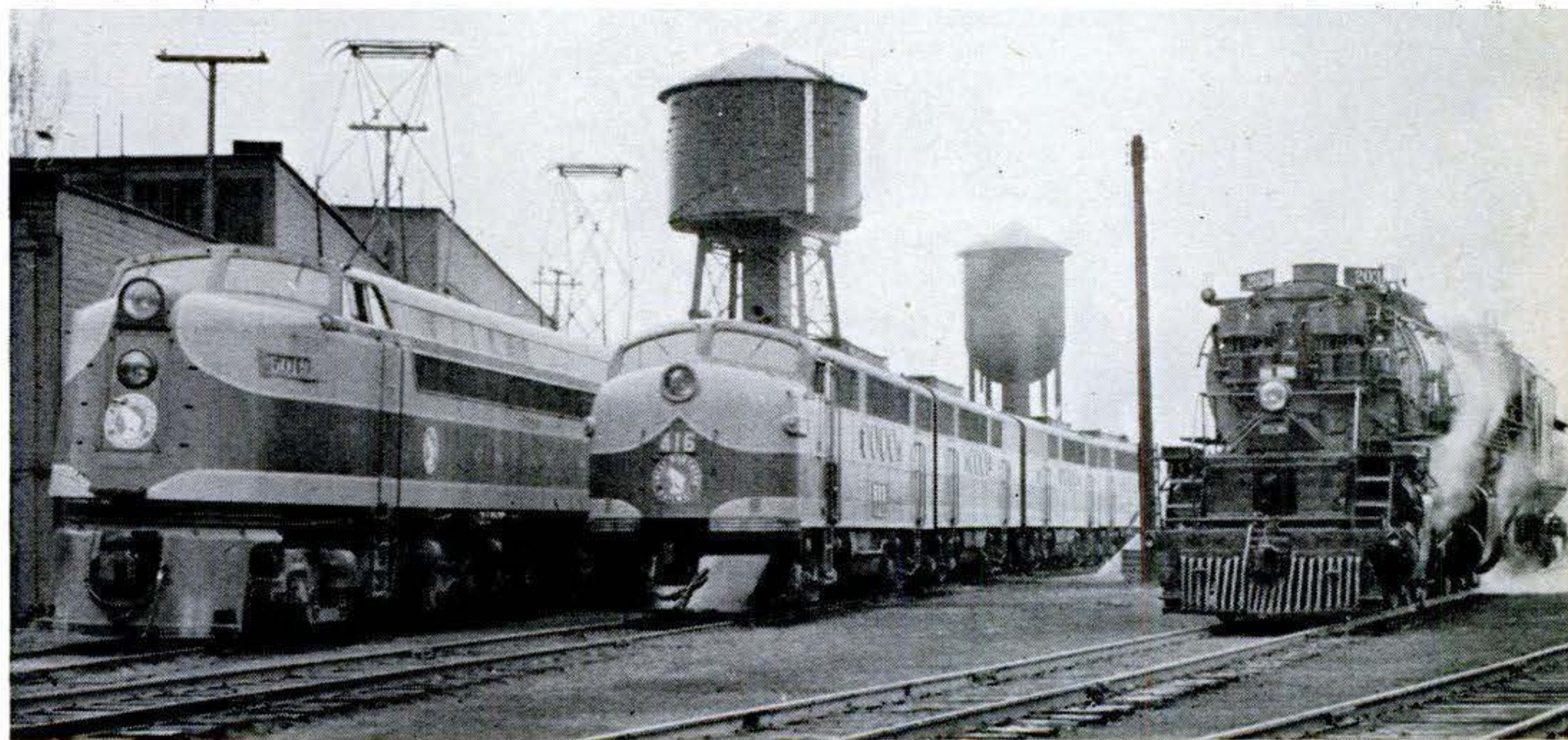
The reverse process known as regeneration was returning to the trolley system approximately 30 percent of the juice it had taken to get the Empire Builder to the summit of the mountains. How much of an economy factor was this in the whole operation of the electrified railroad? Gaynor did some quick figuring in a notebook he carried in his back pocket. In 1951, he said, the Great Northern had burned \$450,000 worth of kilowatt-hours, but the juice restored to the wire through regeneration had reduced the railroad's net bill from the power company to \$315,000.

#### *Rolling Down the Mountain*

Safety was involved as well as finances. Gaynor explained that by turning the traction motors into generators, the train could be slowed to barely two miles an hour on the Great Northern's steepest grade, down which we now were steadily rolling. In a way, it was like going downhill in second gear in an automobile, with the resistance of the engine holding the car back and saving wear and tear on brake bands.

A signal light twinkled yellow as we crossed the 140-foot-high viaduct over Nason Creek Canyon, then it beamed green again and our pace quickened. The Empire Builder wound down through Chumstick Gorge, peeked at narrow Tumwater Canyon

[\[Continued on page 236\]](#)



**YOU PAYS YOUR MONEY** and you takes your choice. Three types of locomotives lined up in the yards at Wenatchee, Wash., are (left to

right): 5,000-horsepower single-cab electric (built for GN by GE), 5,400-horsepower four-unit Diesel and oil-burning steam Mallet.

**A reporter who tags along on the Economy Run "just for the ride" finds that the way most people drive is not the way to save gas.**

**By Andrew R. Boone**

**I**T WAS three a.m. when the starter's flag dropped. The early morning air was crisp. The sky was clear. The streets were almost empty. Los Angeles was asleep.

Except for a sketchy murmur of conversation among the crews of the 26 cars entered in the 1952 Mobilgas Economy Run, the silence was complete.

Drivers bent over their wheels, waiting. Ahead of them lay 1,415 miles and three days of driving over mountain, plain and desert to Sun Valley, Idaho. In the course of the run they would descend 70 feet below sea level and climb more than 8,000 feet above. Temperatures would range from more than 100° to below freezing.

The man who used the least gas would

be the winner. Fuel tanks had been topped off. The first stop was 250 miles away.

The driver at the wheel of the first car in the line pressed his starter button. His engine caught. He didn't idle. He started rolling immediately. That saved gas.

One by one, at two-minute intervals, the other cars moved off. The drivers were knowing. They all did it the same way: Start the engine and engage the gears instantly; shift into high as soon as the car has enough momentum to keep from killing the engine.

Bringing up the rear was the car I was in. It wasn't an entry. We were just going along to look. Unwittingly, we were going to show how *not* to win an economy run.

"Your car," Art Pillsbury, supervising the run for the American Automobile Associa-

## Class Winners in 1,415-Mile Economy Run



**ART ELLIOTT suggests:** "Tune up your engine before a trip. Poor carburetion, bad ignition and poorly seated valves steal gas and power. Every driver should correct his carburetion each 14,000 miles."



**JIM ABBOTT:** "Adjust the carburetor for lean mix and low idle. Space spark-plug gaps to factory specifications and keep the plugs clean. Keep the distributor clean and points carefully adjusted."



**VERNE HOLMQUIST:** "Keep your tank full. Sloshing gas lets air mix in, leaving a deposit of moisture in the cylinders that's tough on the engine. Use oil of proper weight for car and season."



**STARTING FLAG** is dropped on Bill Stroppe at wheel of Mercury which won 1952 Mobilgas Economy Run. For good gas mileage, Stroppe

advises: "Get into high quickly. At 20 miles an hour second eats up a fifth more gas than high. First may take a half more."

## Tell How They Averaged 22 Miles Per Gallon



**JOHN GERFEN:** "Keep the air filter clean. Change exhaust lines and muffler every 30,000 miles. Check brakes every 10,000 miles. They may be dragging. Don't forget to grease the car regularly."



**BILL HOOKS:** "Once you are rolling, think ahead. Pace yourself to get through green lights in town, avoiding stops and starts when possible. Weaving in and out wears brakes, and takes more gas."



**ART RENE:** "Leave your engine in high when going up grade until the speed drops to about 25 miles an hour, then shift down. Stay under 55. Watch your instruments. The dials warn of coming trouble."

tion, had told us, "will burn half again as much gas as the others."

"Yeah?" responded our driver, Bob Blee of General Petroleum Corp., which sponsors the event.

We were entitled to a doubt. We would be driving the same route under about the same conditions as the contestants. Why should we use so much more gas?

Far ahead a traffic signal stopped the first car. That cost gas. It would cost gas

later, too, because the cars had to average a little more than 40 miles an hour. Racing them to make the average would burn up fuel.

All the contesting cars were unmodified stock models, entered in the run by manufacturers, dealers or private owners. They had been allowed a maximum of 2,500 miles of break-in. Then they had been impounded by the AAA until the morning of the run.

The rules were specific: observe all traffic laws; fuel only at official stations; touch nothing on the car except the controls; complete each day's run within the time limit. An AAA observer rode in each car to see that the rules were obeyed.

The scoring was simple. At Sun Valley the weight of each car and its passengers would be multiplied by the miles traveled and the result divided by the gallons of gas consumed. The answer would be in ton-miles per gallon.

## How They Ran

MAKE & MODEL	DRIVER	MILES PER GAL.	TON-MI. PER GAL.
<b>CLASS A:</b>			
Ford 6 Mainline	B. B. Hooks	25.4634	53.8551
Studebaker Champion	Vic Del Coma	27.8220	52.4444
Plymouth Cranbrook	Ed Bishop	23.5220	49.0433
Ford V-8 Mainline	Al Cottle	22.1492	48.1744
Chevrolet Styleline	Pete Novotny	20.5714	42.8915
<b>CLASS B:</b>			
Kaiser Deluxe	Art Elliott	24.6480	53.6094
Studebaker Commander V-8	J. R. Van Trigt	25.5968	52.9854
<b>CLASS C:</b>			
*Mercury Monterey	Bill Stroppe	25.4093	59.7118
Studebaker Land Cruiser V-8	Bill Heimberger	25.3832	53.5586
<b>CLASS D:</b>			
Hudson Wasp	Jim Abbott	20.4638	47.7830
Chrysler Windsor	Rudy Resnick	19.3599	45.9798
<b>CLASS E:</b>			
De Soto Firedome 8-6 pass.	Verne Holmquist	21.2777	54.7368
Hudson Hornet	Hart Fullerton	20.8274	49.8816
Hudson Commodore 8	Joe Ricketts	20.3973	48.8516
Packard 200	H. Michelson	19.2278	44.9930
<b>CLASS F:</b>			
Chrysler Saratoga	John Gerfen	19.0237	49.1762
Packard 300	L. P. Butts	16.4211	40.8065
<b>CLASS G:</b>			
Lincoln Capri	Art Rene	22.3562	58.9085
Chrysler Imperial	Danny Ames	19.0802	52.1844
<b>CLASS H:</b>			
Chrysler Saratoga-8 pass.	Lewis Jabro	17.6520	50.5729
Packard 400	Willis Parkinson	16.9509	43.1400
De Soto Firedome-8 pass.	Randy Maahs	Disqualified**	
<b>CLASS I:</b>			
Chrysler Crown Imperial	Bob Burns	16.2362	53.1736
<b>SPECIAL LIGHTWEIGHT 4-CYLINDER CLASS:</b>			
Henry J-Corsair 4	W. S. Bell	30.8558	51.3749
<b>SPECIAL LIGHTWEIGHT 6-CYLINDER CLASS:</b>			
Plymouth Concord	Bill Cameron	23.0797	47.0250
Henry J-Corsair 6	Willard McArthy	26.3676	44.8908
<b>Average-All Cars</b>		<b>22.0057</b>	<b>49.9901</b>

\* Sweepstakes winner.

\*\* Obtained fuel from unofficial refueling station.

### Cars Carry Just Enough Gas

From the Southern California coastal plain we climbed up through San Geronio Pass. Engines throbbed. That cost gas. But the table-flat Imperial Valley gave the engines a respite.

Bob Blee was stepping on it.

Traffic lights stopped us occasionally. Some of the drivers, encountering red, shut off the ignition and fired up again on green. That saved gas.

At Blythe, the first refueling stop, teams of attendants manned four lines of pumps. Each driver took aboard only enough gas to



**JACKS** were used to level cars so tanks could be filled completely at end of run. Topping off tanks enabled AAA crewman to determine fuel consumption on last leg of trip.





**TOWERING CLIFFS** face contesting car as it crosses spectacular Navajo Bridge over Colo-

rado River, east of Grand Canyon. All the cars were impounded at both overnight stops.

reach the next pumps with a little to spare. Extra pounds would cost gas.

One car took 11 gallons, was gone in three minutes. Another drank 12, was away in less than four. A third needed only 10 gallons. Our car took too much.

We rolled again, across the muddy Colorado River into Arizona, each car in its own speed pattern. Now we hit mountains again.

The night's stop was the south rim of the Grand Canyon. Long shadows were fingering the canyon's far side when one of the cars in the run coasted to a stop just 10 seconds inside the deadline.

The drivers were varying little in their techniques. They did mental gymnastics on time-distance factors to keep speed as low

[Continued on page 234]



**STATION ATTENDANT** watches pump dial as he refuels a car at intermediate stop. Any gas spilled in pan was measured and deducted from total delivered to contesting car.



**TIRE PRESSURES** received careful attention before start of run. At its close, AAA officials checked pressures to make sure tires had not been extra-inflated to improve mileage.

# 6,663 Miles by Comet

By Fraser Wighton

## JOHANNESBURG, South Africa

**E**IGHT miles up, winging along at a comfortable 490 miles an hour, the pilot called up Johannesburg: "Am starting to lose height prior to run-in." He glanced around the control panel and eased down.

An hour later, sliding like a silver bird out of the sky, the British Comet Jetliner touched down at Johannesburg Airport and rolled to a stop to finish the world's first scheduled passenger flight by jet.

**I was the only correspondent aboard the great ship for the entire London-Johannesburg flight.**

Carrying an all-up weight of 105,000 pounds—including 36 passengers, crew of seven, and freight—the Comet completed the 6,663-mile journey in 23 hours 33 minutes over-all, about nine hours less than it takes a piston-engine airliner flying a route 1,000 miles shorter. Fare: \$490.

"It was like being in a flying hotel," said air hostess Audrey Cartnell.

"It was just absolutely wonderful," said Diana Hannsford, 22, a London policewoman, here to visit her family.

Said Capt. R. A. Alabaster, pilot on the last lap: "You just get up to 38,000 feet, the jets sing quietly to themselves—and Africa slips by beneath you."

**The flight ushered in an era of jet-craft services that will halve the size of the world in terms of air travel.**

The jetliner arrived here on May 3, and took off on May 5 for the return flight to London.

The Comet took off from London Saturday afternoon. Stopovers were made at Rome, Beirut (Lebanon), Khartoum (Sudan), Entebbe (Uganda) and Livingstone (Rhodesia). Crews were changed at Beirut and Khartoum.

Crewmen reported not a hitch in the four de Havilland Ghost Jets—each developing 5,000 pounds of thrust.

The Comet traveled at between 35,000

and 40,000 feet, unhindered by weather and air currents. Only fighter planes normally fly so high.

The sleek ship streaked along at its economical cruising speed of 490 miles an hour. After leaving Rome seven minutes late, the pilot stepped up the pace to 525 to Beirut.

**But on the last stages the plane dawdled along sometimes at less than 490 to keep to schedule—and still landed seven minutes early.**

Inside the dove gray and blue pressurized cabin the 36 fare-paying passengers talked, smoked, marveled and slept. Just out of Rome they enjoyed a grandstand view of Mount Vesuvius and the Isle of Capri in the glow of a Mediterranean sunset. They relaxed over a chicken dinner, with appropriate wines. Because of the absence of vibration, the steady drone of the jets and illusion of motionless suspension lulled many to sleep.

An air-conditioning plant and pressurization kept the cabin comfortably warm, though the craft was rushing through air which was 74° below zero.

Free from down drafts at its great altitude, the craft didn't take those sudden, sickening drops that turn your stomach over.

Through the hours to dawn the Comet ate up half the length of the continent of Africa, greeted by small welcoming parties at Khartoum and Entebbe.

As she nosed down to Uganda Airdrome, the vast panorama of Lake Victoria greeted the awakening travelers.

**The traffic from the airport to Johannesburg was so heavy that it took some Comet passengers almost as long to get to the city—10 miles away by road—as it did to fly from Livingstone, more than 600 miles away.**

While this craft is introducing air travelers to the new jet age, de Havilland factories will start turning out newer variations of the Comet jet airplane (shown in picture on page 142).

END

**You can add an airy apartment  
to your home by lifting part  
of the roof. Step-by-step pictures show how it is done.**

# Raising the Roof

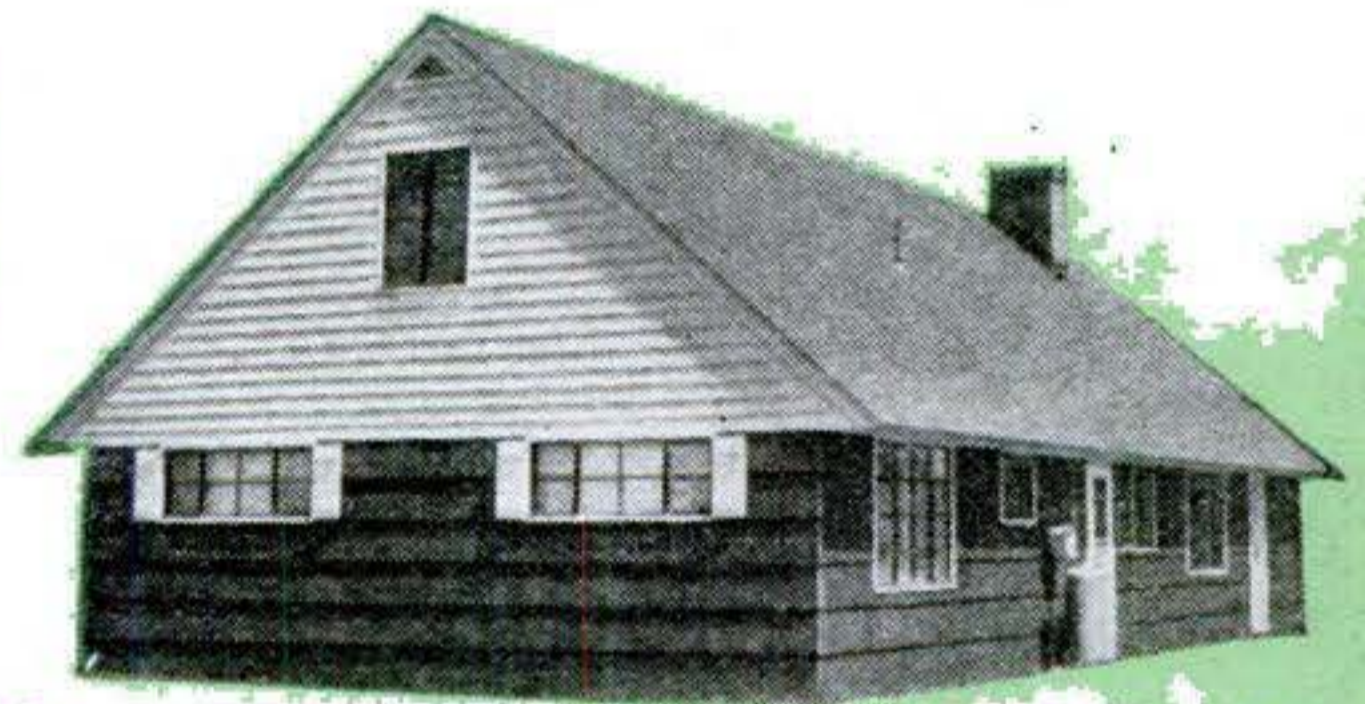
**By Denis Sneigr**

**A**T SEVEN one summer morning, two men began sawing out a section of roof. By nightfall, the roof section had been raised to form a 27'-long dormer, complete with studding, sheathing and building paper.

Raising part of the roof is one way to add more living space to your home. The trick is to saw a three-sided flap out of the roof, leaving it hinged at the ridge pole. Then you jack up the edge that parallels the eaves so the flap forms the roof of a roomy dormer.

Bill Kautz did this job on his new home at Huntington Station, N. Y., and gained a complete attic

**FINISHED DORMER (below) was built by raising part of the roof, adding a complete roomy apartment to this home. At right is the same type of house without the dormer.**



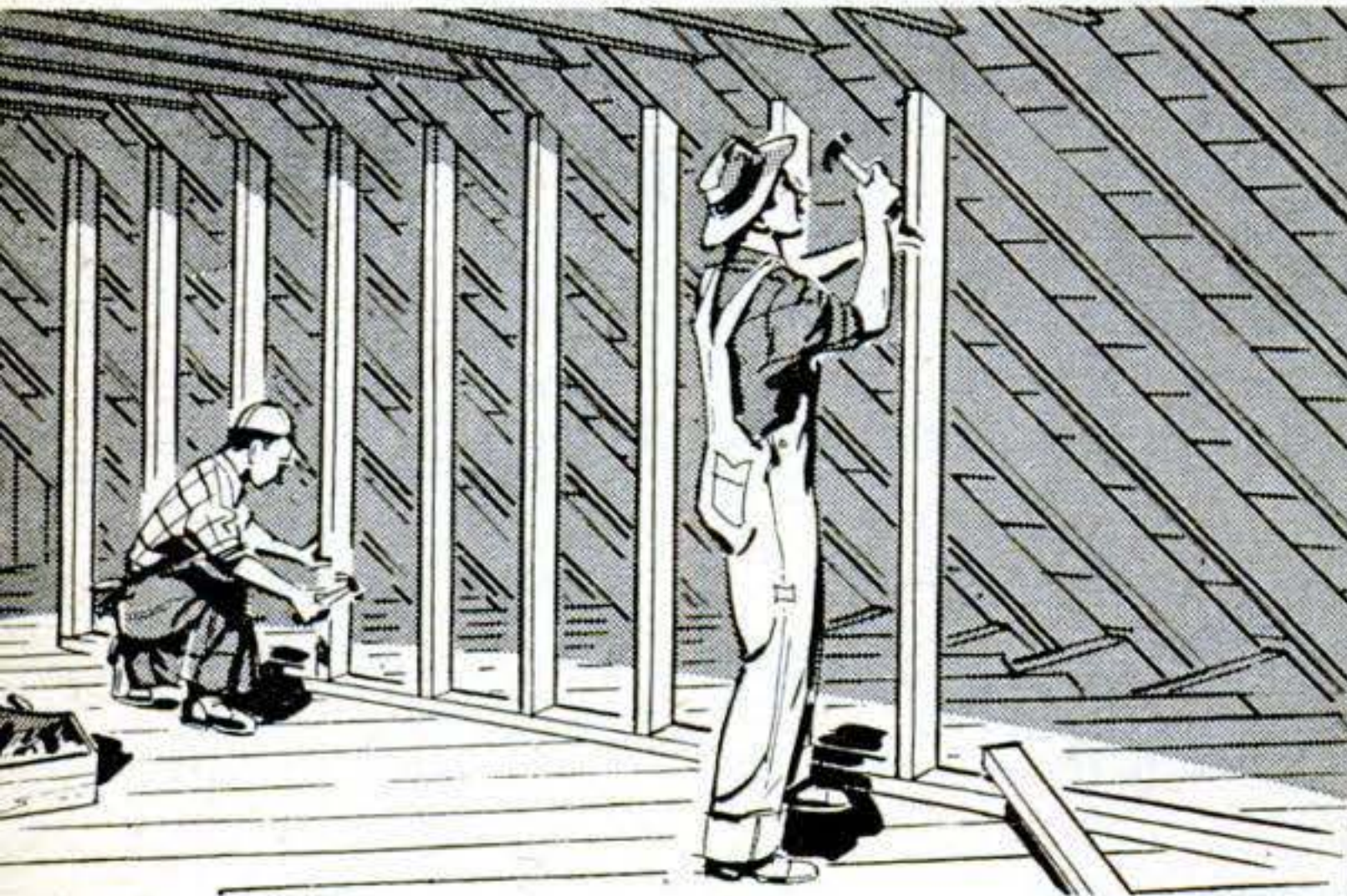
apartment—living room, kitchenette, bedroom and bath.

**Preliminary work.** The actual sawing and raising of the roof can be a one-day job for two men if all the preliminary work is done first. In that way, the roof is open to the weather only for the shortest possible time.

First step is to lay subflooring. Then, on the opposite side of the attic from the dormer, lay a two-by-four soleplate and put in two-by-four studding.

Prefabricate the studding and window framing for the entire length of the dormer. This will then be ready to slap into place as

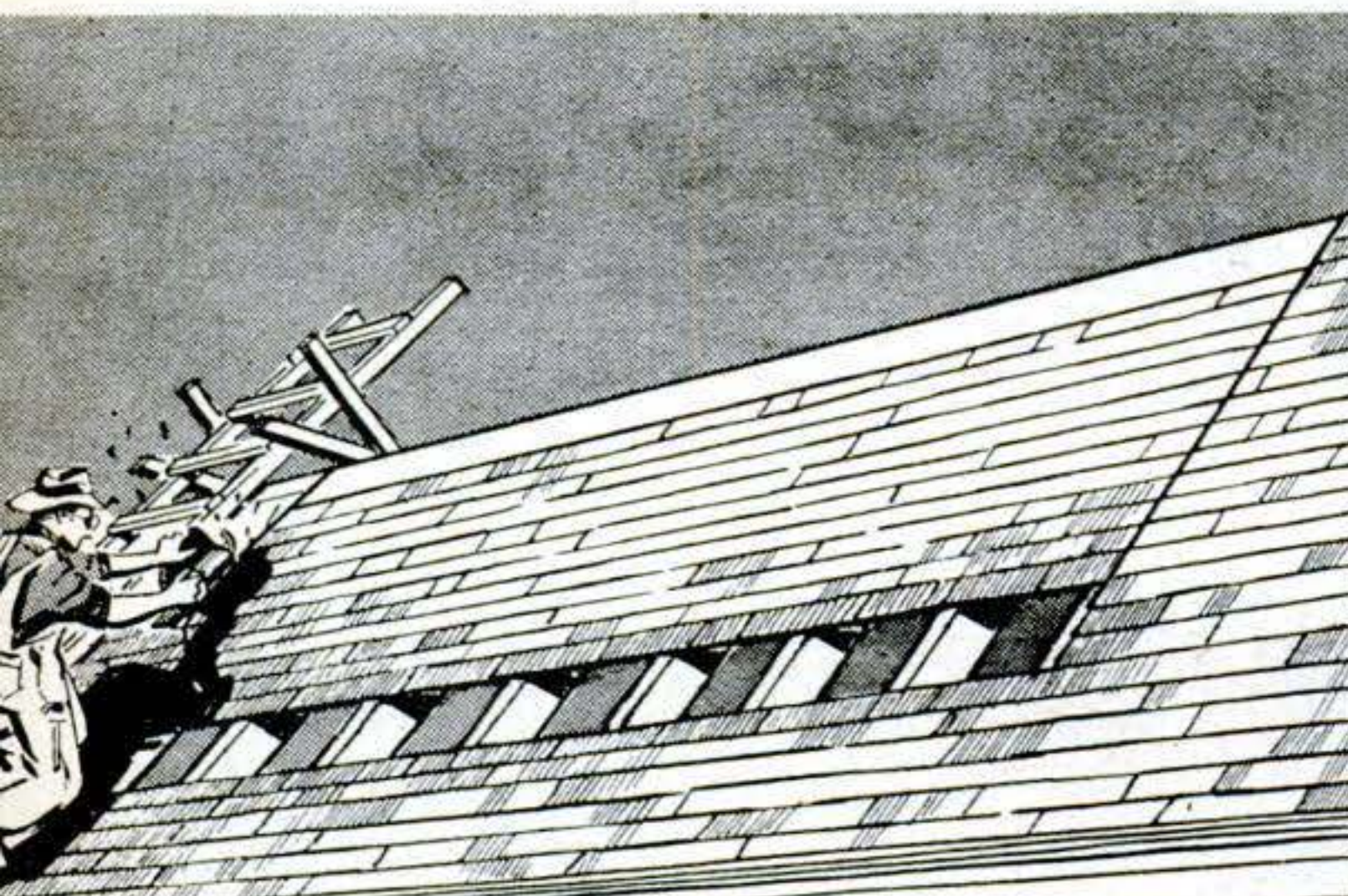
**With the preliminary work done, the actual raising**



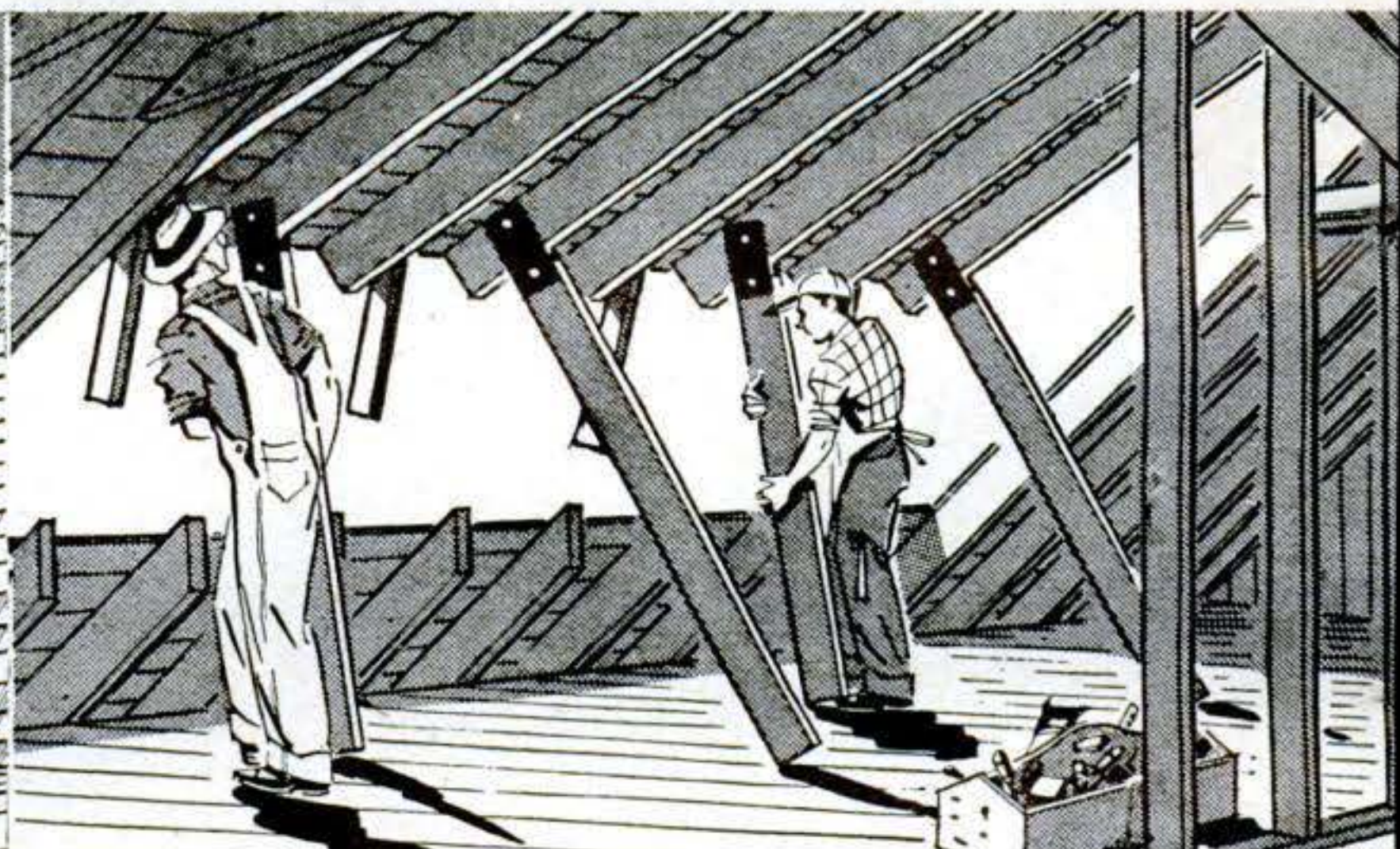
**1 STUDS** are installed opposite side where dormer will be. They act as supports when roof is raised. Studs would have to be installed anyway to finish attic.



**2 COLLAR BEAMS**, which tie rafters together, are removed in area the dormer will occupy. Next the ridge pole is sawed from outside at each end of the dormer space.



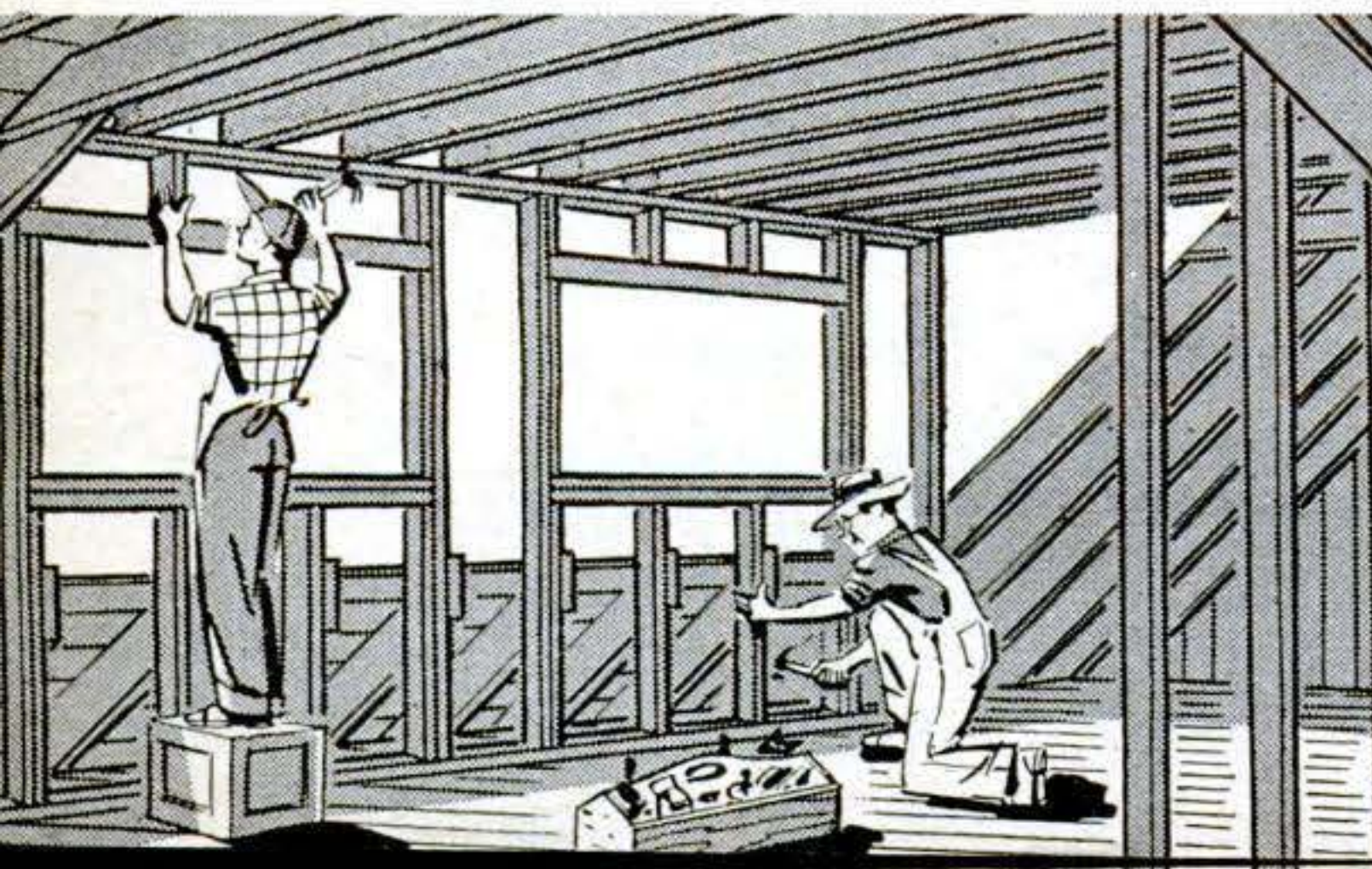
**5 SHEATHING AND SHINGLES**, sawed at each end of dormer, are removed parallel to eaves. The sheathing that was removed was later used in finishing sides of the dormer.



**6 START OF ROOF RAISING** is made by walking forward with the shorter two-by-sixes. These are moved forward slowly until all of them are at right angles to floor.

**9 STUDDING** for front of dormer was prefabricated in two sections before roof was raised. With roof section at desired height, prefab sections were spiked into place.

**10 SHEATHING** is nailed over studs, horizontally on front and diagonally on ends. Use two nails at each stud unless boards are more than 6" wide. Then use three nails.



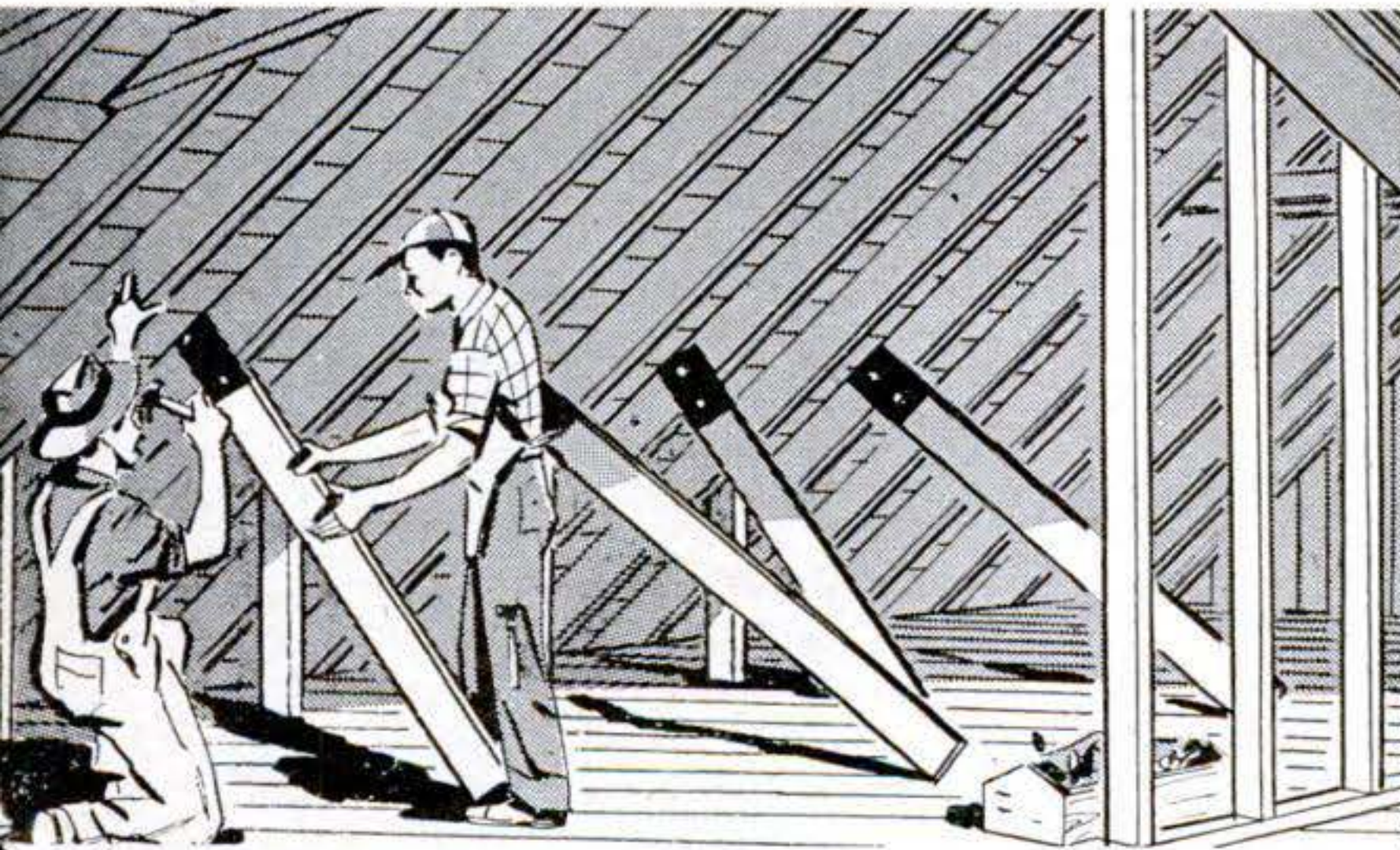
soon as the roof is raised to its proper height. If it is to be a long dormer, build the studding in two or three sections for easier handling. Studding for the ends can be nailed up after the prefabricated section is in place.

Other preliminary steps include removing collar beams for the length of the dormer

and nailing a 2'-wide strip of 26-gauge galvanized flashing along the ridge of the roof for a hinge. Before nailing on the flashing, remove the ridge shingles and the top courses on each side. Replace these shingles after the flashing has been nailed to the sheathing.

**Jacking up the roof.** Make a template

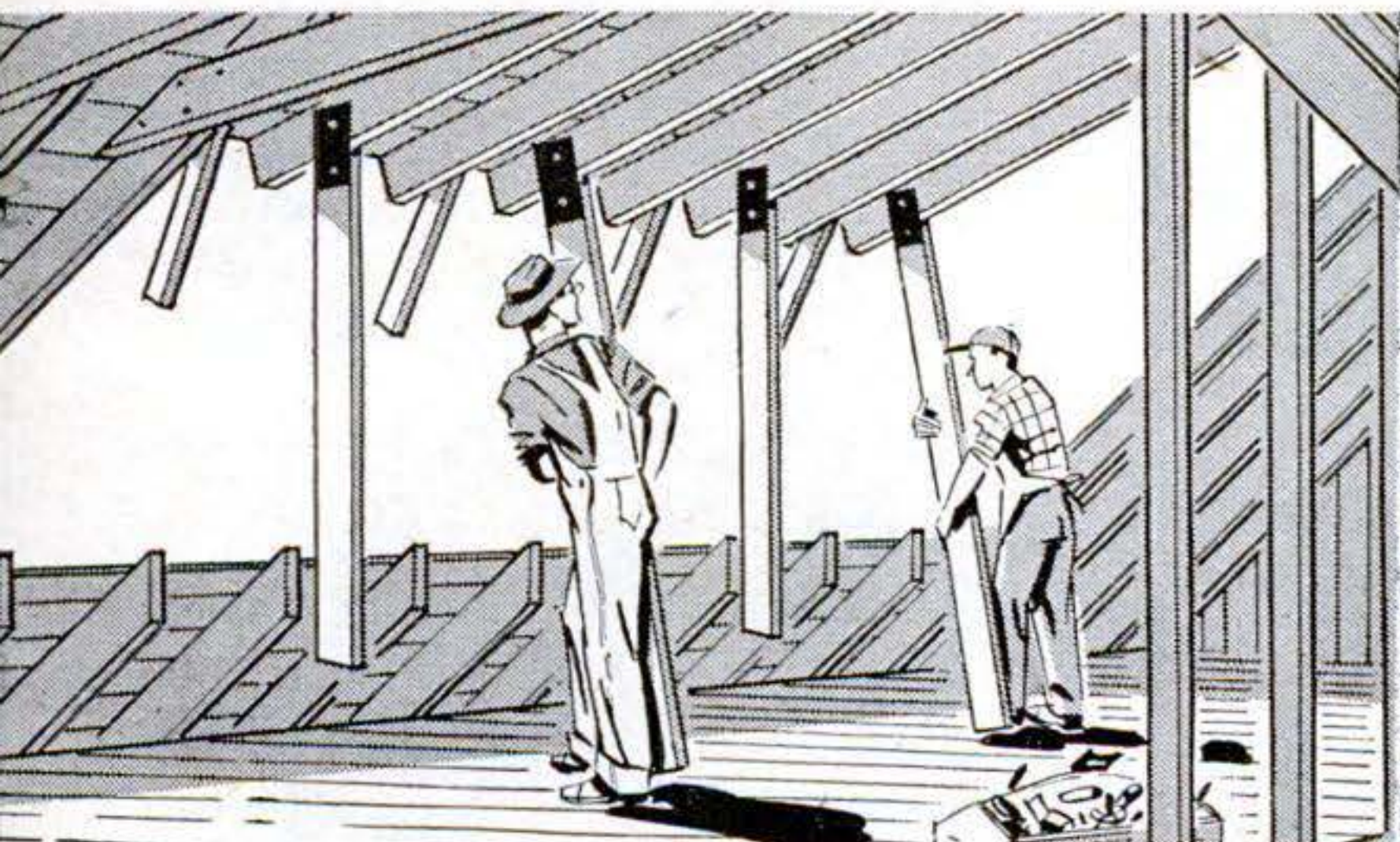
**of the roof section is a one-day job for two men.**



**3 FOR TEMPORARY SUPPORT** when dormer section of roof is cut, two-by-sixes are used. They also serve to raise roof section. Sheet-metal side plates hinge two-by-sixes to rafters.



**4 TIN FLASHING** is nailed along ridge after ridge shingles have been removed. Flashing acts as super hinge when roof section (indicated by heavy lines above) is raised.



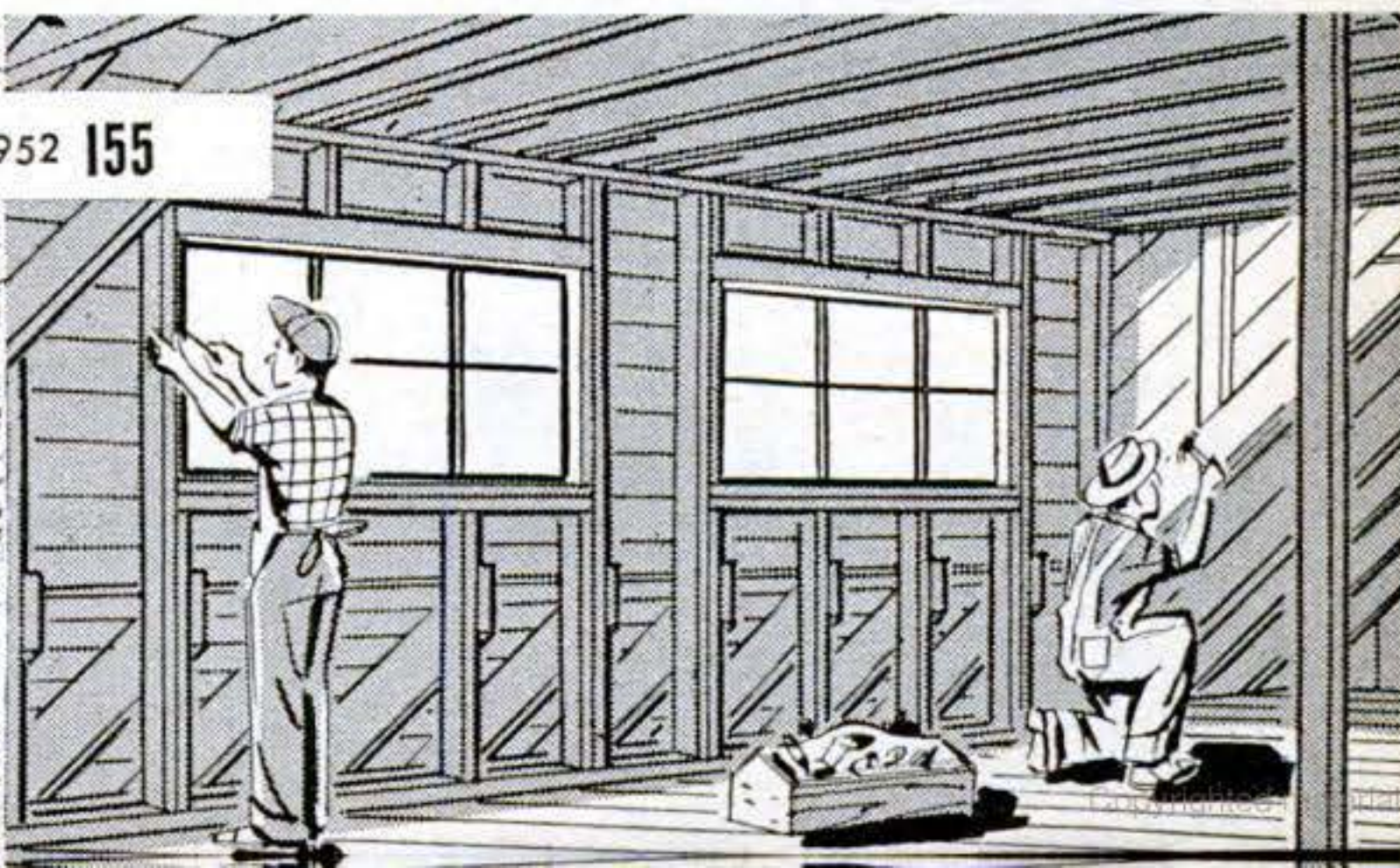
**7 ROOF RAISING IS COMPLETED** by moving longer two-by-sixes until they are vertical. Two-by-sixes must be moved slowly, each one being pushed forward only a little at a time.



**8 RIDGE POLE** and rafters are strengthened by spiking in short 2" by 6" collar beams under ridge pole and by adding wedges between tilted ridge pole and rafter ends.

**11 BUILDING PAPER** and flashing come next. These are followed by finish siding, trim and shingles to cover flashing. Siding should be the same as on the rest of the house.

**12 INTERIOR FINISHING** should be done after exterior is completed and sash installed. In drawing below, ceiling joists have not been put up. *Please turn page for more details.*



for the ends of the dormer rafters. The shape of this template will depend on the pitch of the dormer roof. But the ends of the rafters must be vertical.

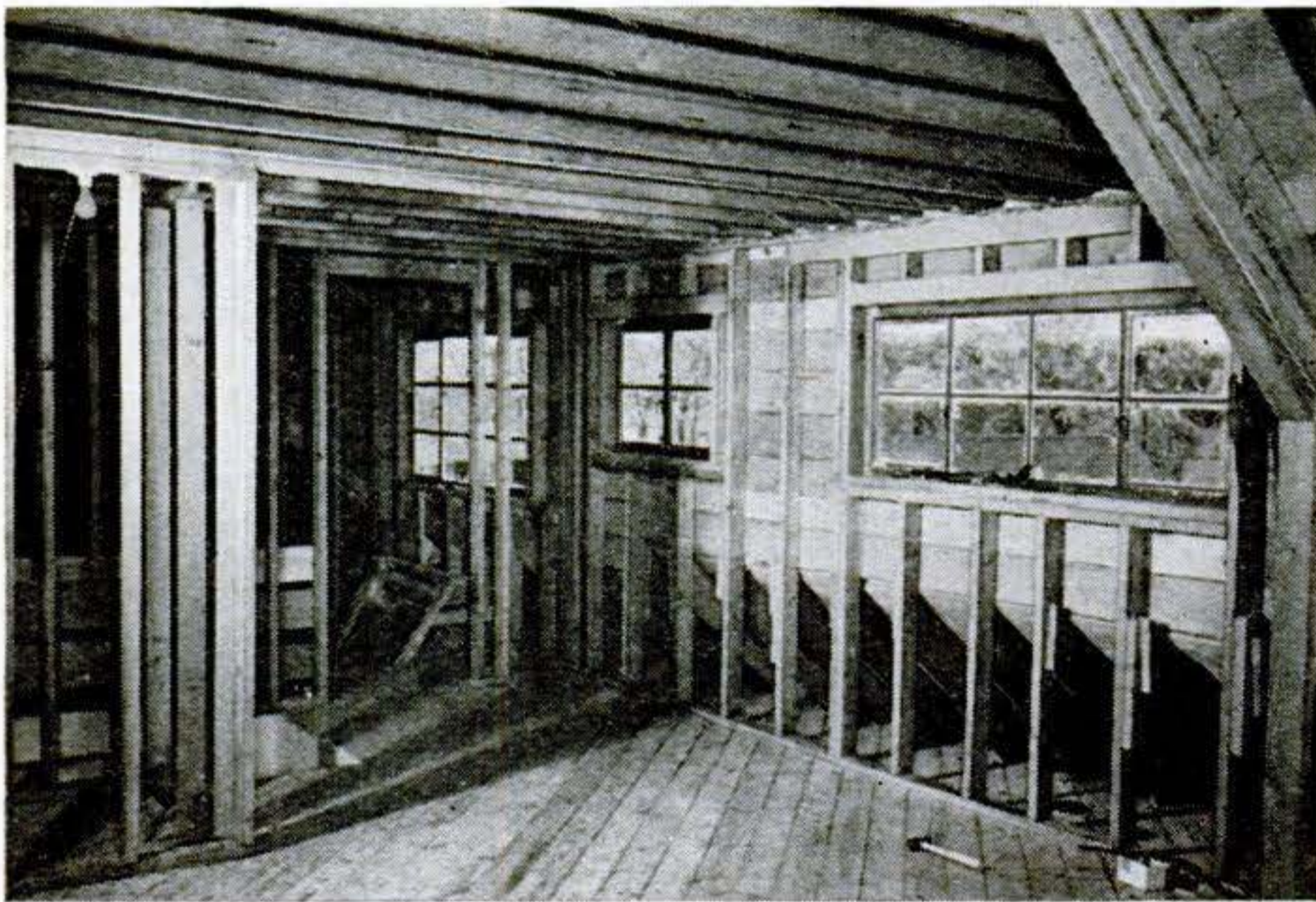
You raise the roof by jacking it up with two-by-sixes, using short ones to start, then longer ones to get the dormer to the desired height. These are hinged to the rafters by spikes and pieces of heavy flashing. By moving the timbers forward a little at a time, you can gradually raise the roof. If the dormer is to be a long one, it may be necessary to nail blocks to the two-by-sixes and use a length of two-by-four as a lever to edge the two-by-sixes forward.

**Interior finish.** Kautz finished the walls

of the living room in knotty pine. The same paneling was used to build the cabinets in the kitchenette. In the bedroom, wallboard and wallpaper were used.

Heating for the new unit is provided by baseboard convectors and hot water. The heating system for the dormer is separate from the radiant heating of the rooms below, with its own pump and thermostat. In this way it is not necessary to heat the attic when the dormer rooms are not in use.

The sketches on the preceding pages show you a smaller dormer than the one Kautz built. However, the construction methods and the step-by-step procedure for both dormers are identical. END



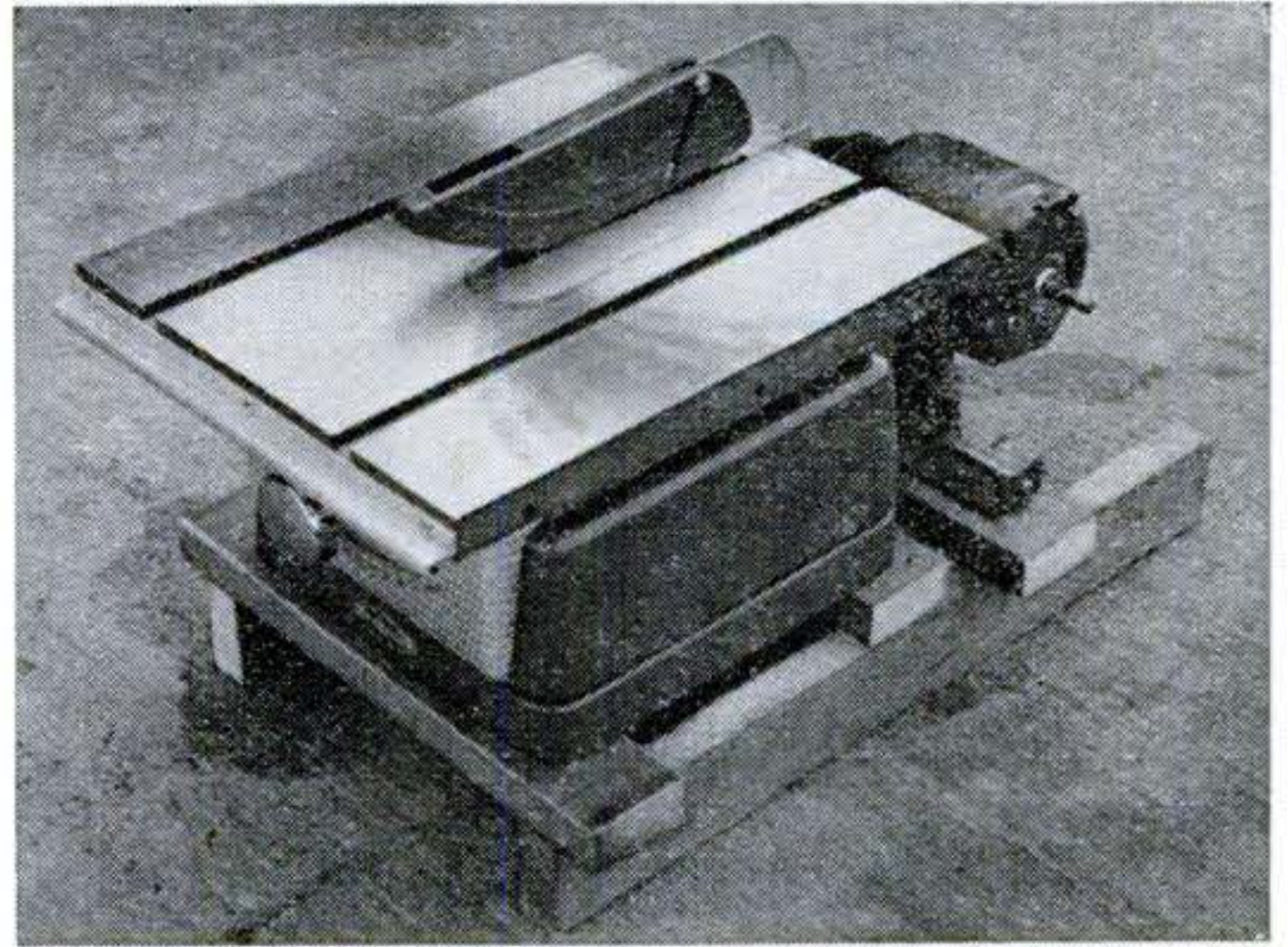
**SAME VIEW** before (left) and after (below) interior was finished. Photo was taken looking from living room into kitchen area. Door at far end leads to bedroom. Bath is on other side of bedroom. Walls of living room and kitchen are knotty pine; ceiling is acoustical tile. Bedroom has wallboard and wallpaper. Thermostat that controls attic's separate heating system is on wall at left of bedroom door. Stairs leading to lower part of house are also at left of bedroom door.



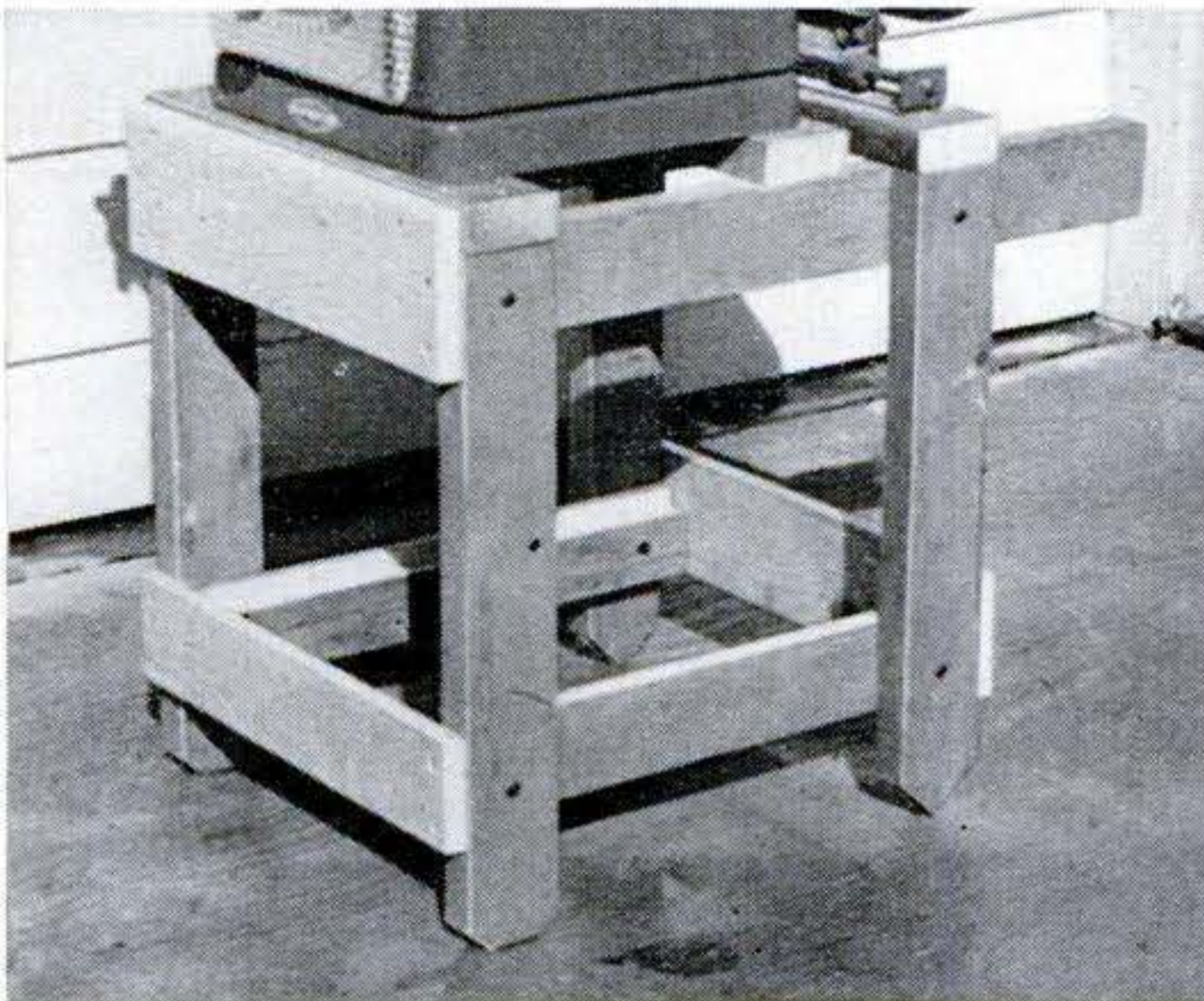
# This Power Saw Built Its Own Table

THAT exciting new circular saw can be put to work right away building its own table. Four cuts through a two-by-four with a handsaw will give you five pieces on which to mount the saw and motor. From there on, you're in business with power, and the rest of the table is a cinch. The basic saw mount becomes the top of the table. In proportioning the frame, be sure to allow enough overlap on the front and rear cross-pieces to straddle the legs.

On my own saw table, I chamfered the front legs, but pointed the rear ones. Then I shod these with metal angle brackets. This leg arrangement makes it easy to drag the saw to different parts of the shop.—Robert Hoppough, Encino, Calif.



**1 SIMPLE FRAME** holds saw and motor together so you can use power to cut the remaining table members. Handsaw five pieces as shown and assemble them with wood screws.



**2 ADD LEGS AND RAILS.** Chamfer the ends of two two-by-fours and saw two others to V points. Cut all four exactly the same length. Bolt or screw legs, frame and rails together.



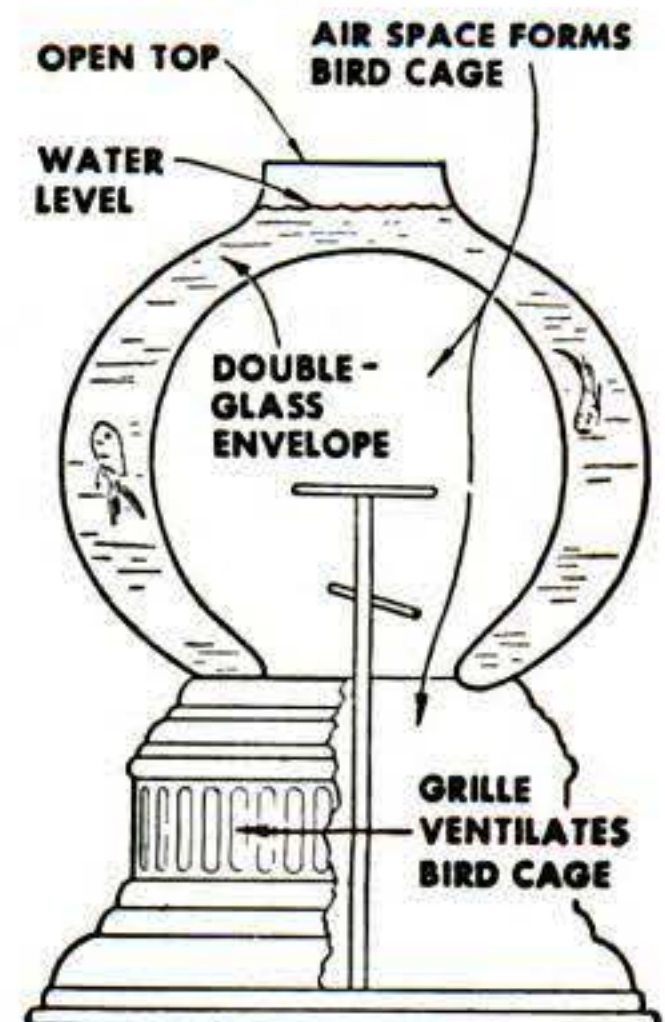
**3 FINISHED TABLE.** Dust drawer is a cardboard carton hung on wood frame. Plywood table extension at rear shields motor from sawdust. Accessories are hung on side.

## How Tropical Fish Can Swim Around Live Parakeets



THESE birds get a fish's-eye view of the world, but seem quite at home with their neighbors, a number of tropical fish who are equally nonchalant about the whole thing.

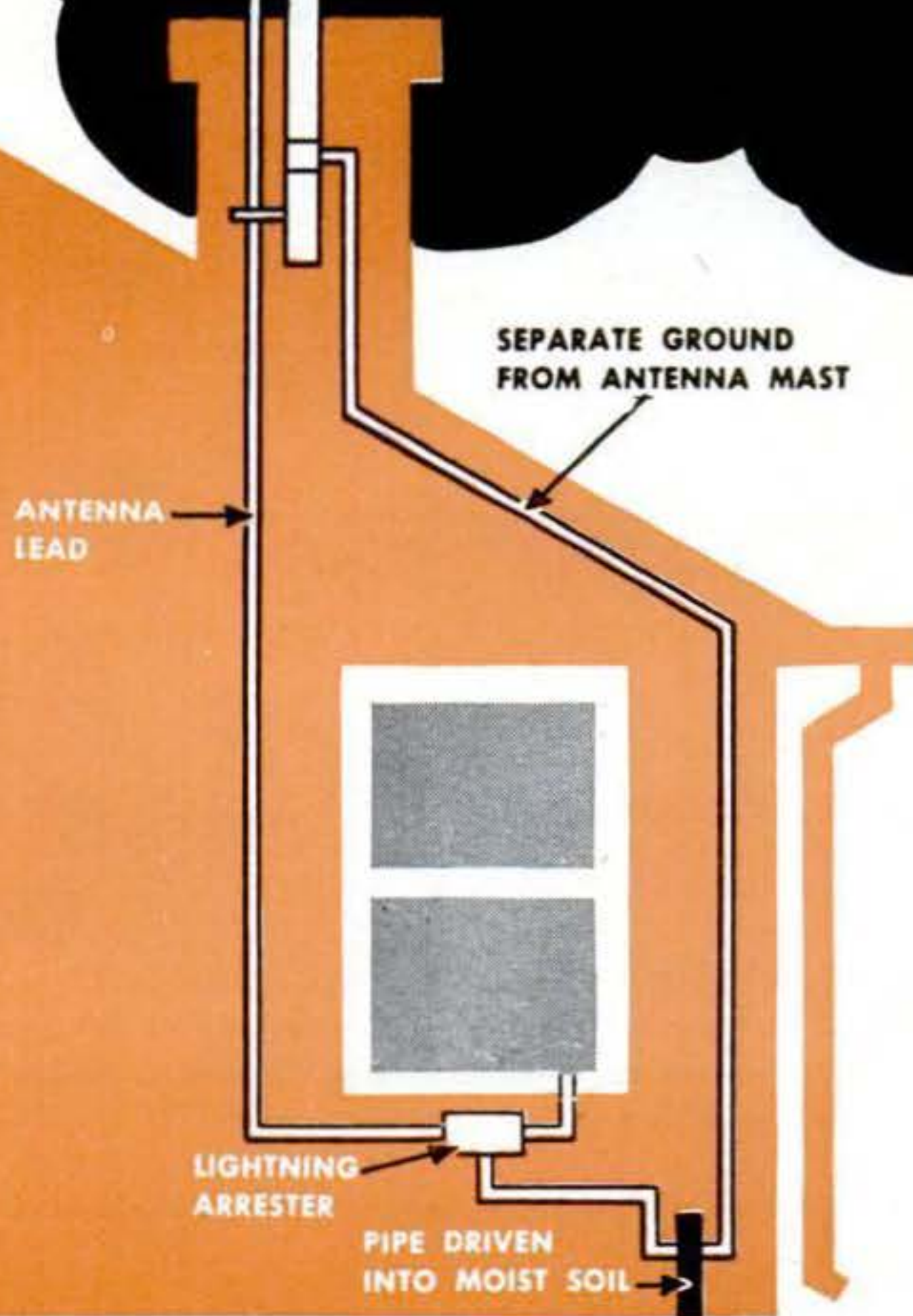
What enables the two to live together and like it is a double-walled bowl 23" high. The space between the walls holds water and is open at the top. A ventilated base forms part of the birds' living quarters. Made in Italy, the Wonder Fish Bowl is sold by the Westchester Aquarium of White Plains, N. Y.



# Lightning-Proof Your TV Antenna

**Here are the simple steps that will protect your house and set from the high voltage in the sky.**

**By John P. Kenneally**



## About the Author

John P. Kenneally, writer of the accompanying article, is supervisor of radar and electronics training at the Pilot Training School of Pan American World Airways at New York's International Airport. He is the author of "Telefixit," a best-seller among TV-repair books. "Television," says Kenneally, whose interest in home TV maintenance grew out of a hobby of building his own sets, "is going to be with us a long, long time, and just as it pays to have a little knowledge of your automobile, it will pay to learn more about what makes your television receiver work."



**W**HETHER you know it or not, there's a lightning rod on your roof if you have a TV antenna up there. It can build up a charge of several thousand volts from even a distant flash of lightning.

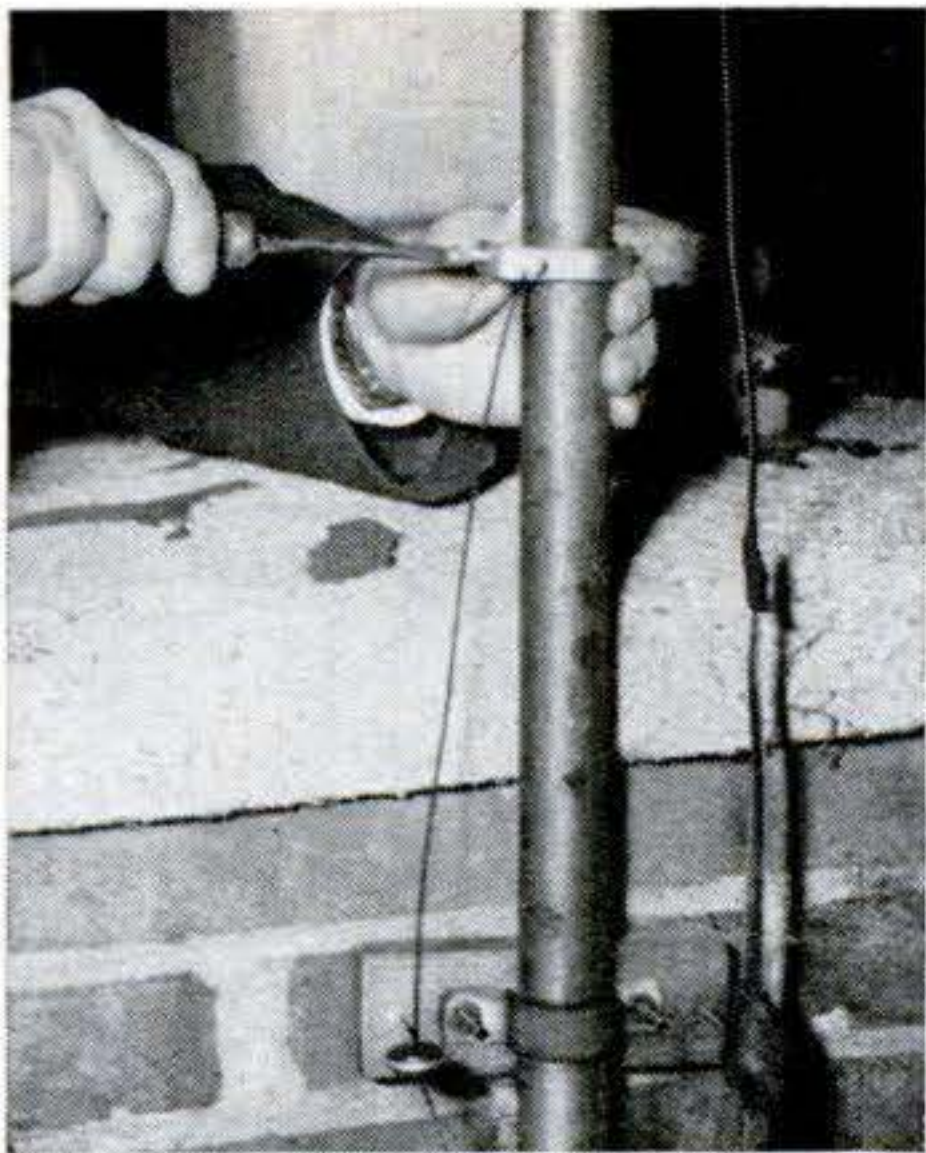
When the charge lets go, it could race down the antenna wire right into your favorite program. If it didn't burn down the house, it would surely make your TV set look like the inside of a pretzel machine on a soggy night.

There is, however, a simple safeguard. A lightning arrester, a silent safety valve

for your antenna, will permit a charge to leak off the antenna before it reaches dangerous proportions. The arrester will actually improve reception, too, by getting rid of static electricity that can cause white streaks and flashes in the picture.

But the arrester cannot do this job alone. It must have someplace to toss those extra electrons. A good ground is necessary. This can be a length of pipe, at least six feet long, driven about four feet into the ground. A damp spot near the gutter drain spout is an ideal location for the ground

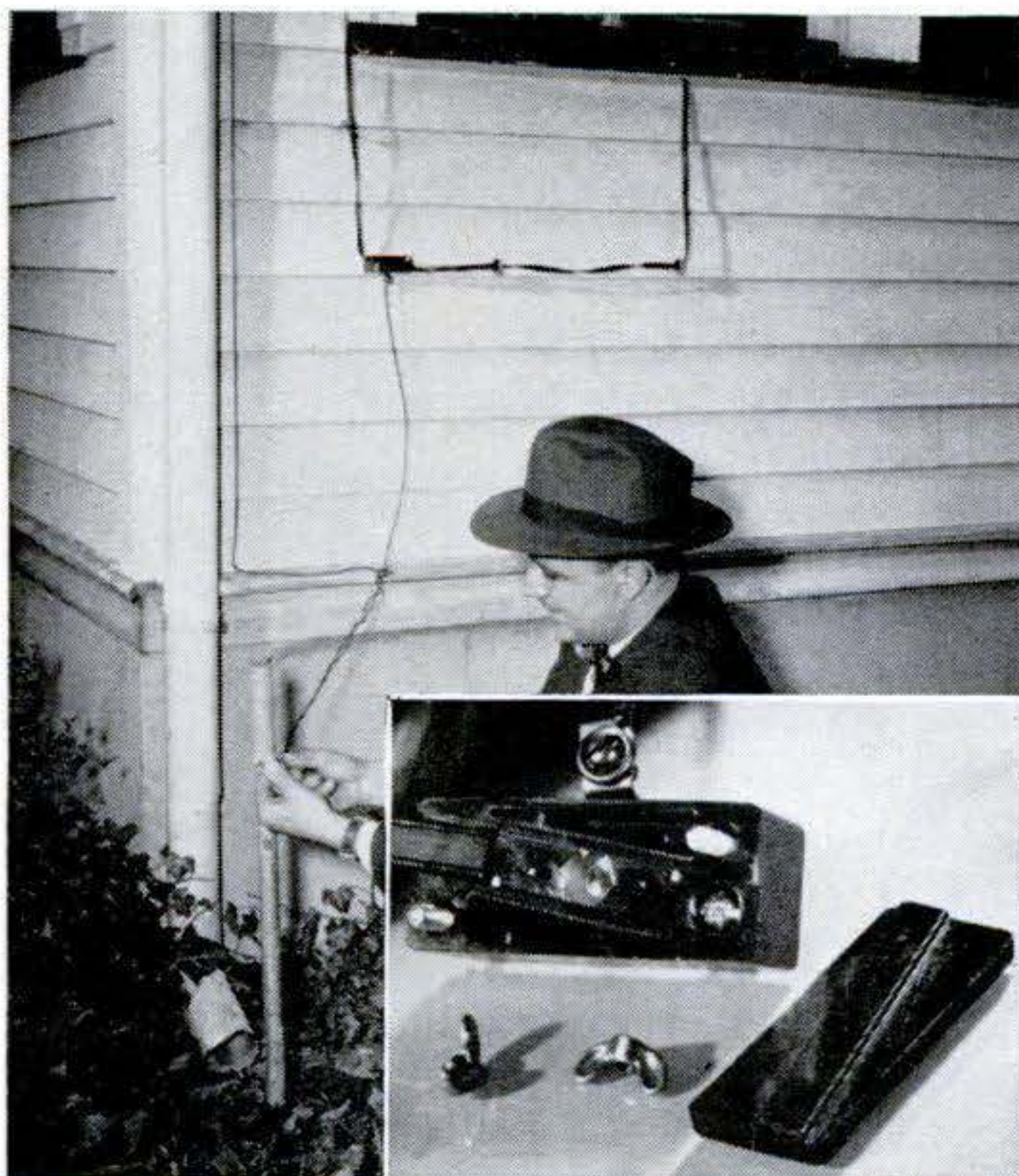




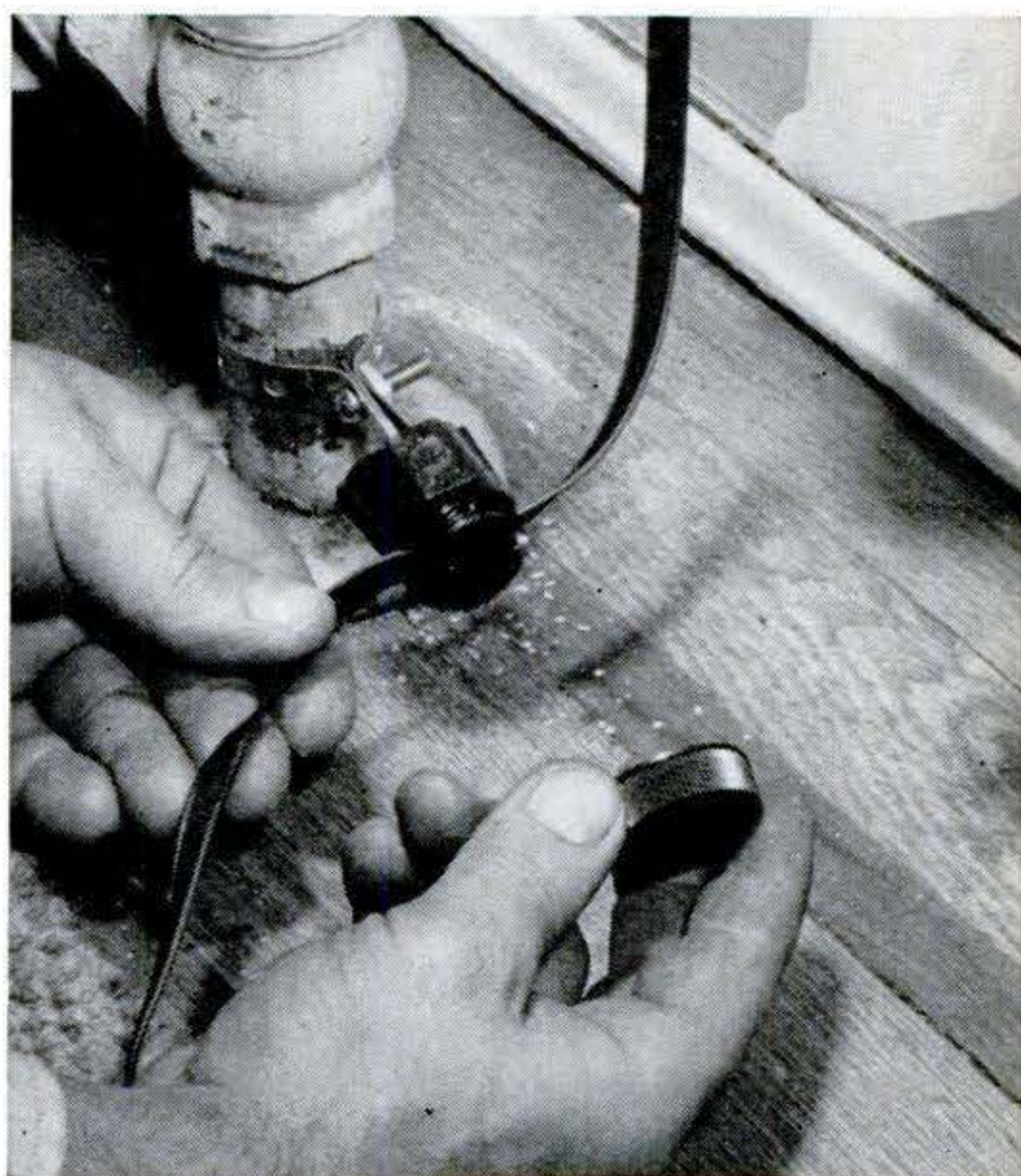
**UPON THE ROOF.** Connect No. 14 ground wire to antenna mast, using special ground clamp with screw that bites into mast for good contact. Wrap-around strap type, if used out of doors, soon rusts into a poor connection that is almost useless.



**HACKSAW A POINT** on a 6' length of pipe and drive it at least 4' into moist soil. An ideal location for the pipe is near the drain spout leading down from the roof gutters.



**MAKING THE FINAL CONNECTIONS.** Arrester, installed on antenna lead, picks off static charge and discharges it through No. 14 wire to ground pipe. Single wire, about 8" to left of antenna lead, grounds mast. Insert shows tiny points in arrester that bite into insulation to contact antenna wire. Arresters are available for all types of TV antenna wire.



**RADIATOR GROUND CONNECTION** offers easier installation. Scrape paint off riser to get a good clean contact and clamp arrester to it. Antenna lead wires are pressed onto the arrester's contact points by screwing on the cover. Ground wire from the mast can be wired to the tightening screw on the contact strap without affecting the arrester.

pipe. Cutting the end of the pipe at an angle will help you sink it without the aid of a pile driver.

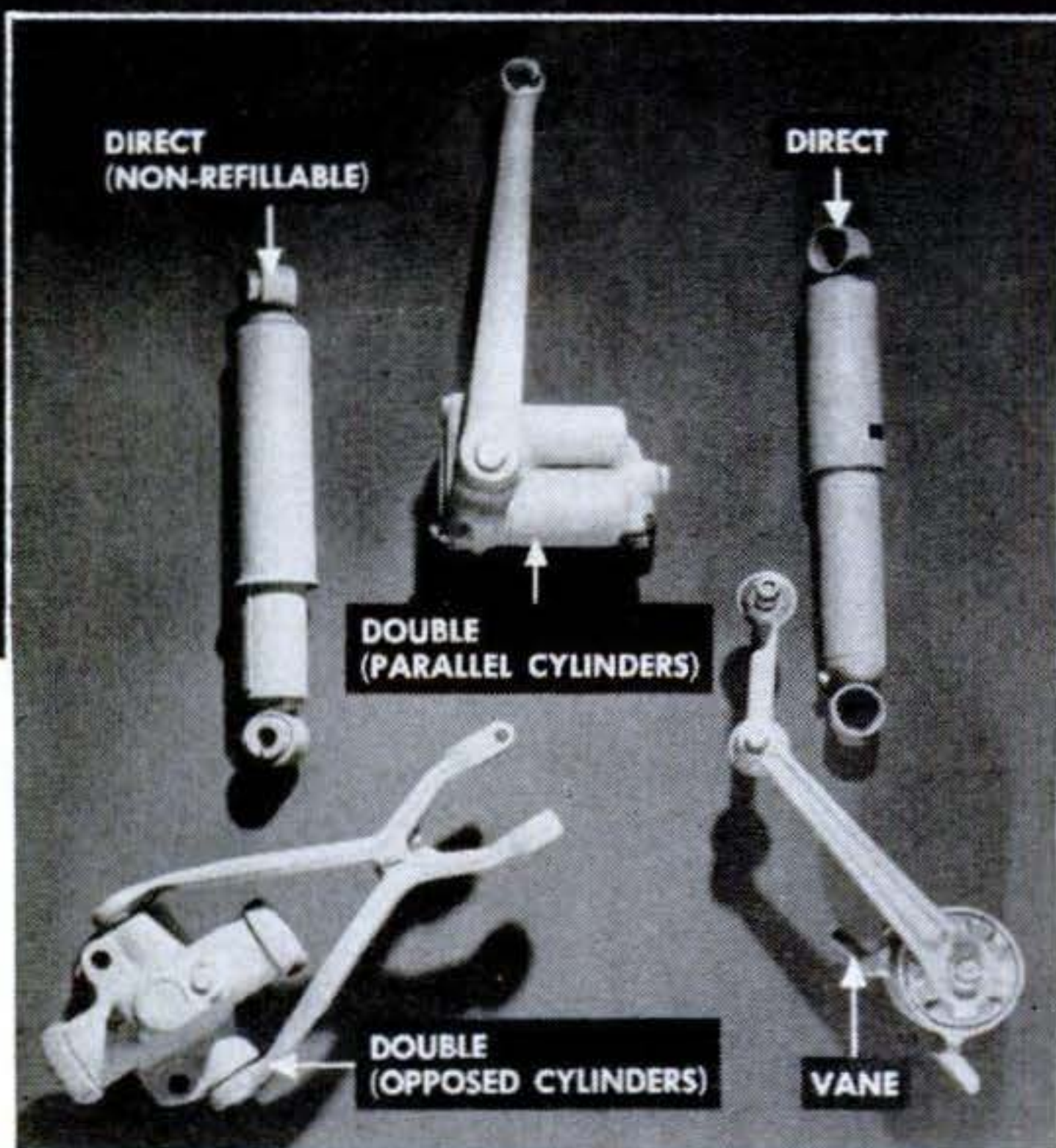
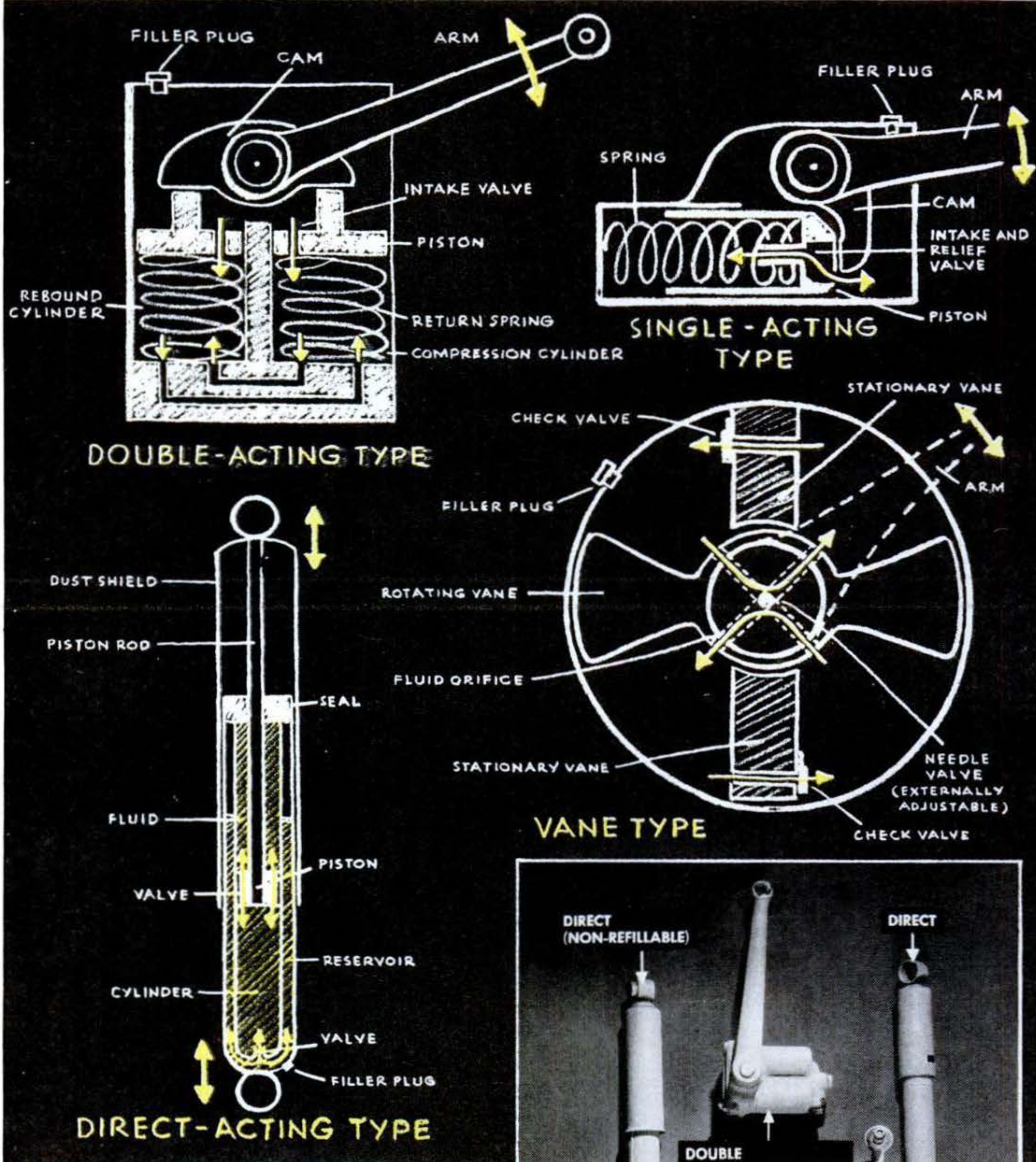
An easier way out is to use a radiator riser or cold-water pipe for the ground connection. Be sure to scrape the paint down to the bare metal before making the hook-up. Never use a gas pipe for an electrical ground.

Aside from the arrester installed on the antenna lead, a separate No. 14 ground wire should protect the antenna mast. You can connect this anywhere on the mast with a

special ground clamp and run it down to the ground pipe parallel to the antenna lead. It should, however, be tacked to the wall at least six inches, and preferably several feet, away from the antenna lead to prevent it from stirring up signal interference that would distort or weaken your picture.

Both wires, the mast ground and the arrester pick-off, terminate at the ground pipe to change that set-wrecking charge of static electricity into a bewildered ostrich burying its head in the ground. **END**

# What You Should Know



**TYPES OF SHOCK ABSORBERS** in general use are limited to four, but each has several variations. All do their job by forcing hydraulic fluid through small passages and valves. In three types pistons exert the pressure. Vanes rotated by the control arm do it in the fourth. The latter type is adjustable to give a soft or hard ride, having a needle valve which regulates the fluid that can pass through the openings. Direct type is most common on new cars.

# About Shock Absorbers

**If they are to do the job of taking bounce out of car springs, you have to give them a little care and attention now and then.**

**By E. F. Lindsley**

**I**F YOUR car hits the bumps hard and bounds down the highway like a frightened deer, it is a pretty safe bet that you have forgotten those mud-encrusted gadgets commonly called shocks.

Shock absorbers are the side-kicks of your springs. For your riding comfort, they must always work together. If springs alone were depended on to soak up bumps, the endless series of leaps and bounds would play havoc with the tires, control-arm bushings, universal joints and brakes—not to mention making the car downright dangerous and miserable to drive.

Shock absorbers level off the spring recoil. Inside them, the recoil energy drives a special viscous fluid through small valves and holes that have been carefully worked out to match the weight and spring action of the particular car.

**Fluid friction does it.** A gentle bump is easy. The fluid eases through the holes without much protest. But when a hard bump tries to push the fluid through the holes too fast, fluid friction jumps into the way and decrees that the fluid can be

## **Check Your Shocks if . . .**

**The car rides badly.** A rough ride is something that can sneak up on you.

**You find excessive tire wear.** Tires that bounce and dance over the road soon become scuffed.

**A spring breaks.** Chances are, bad shocks were the cause.

**Cornering is difficult.** Unless the shocks are doing their job, you'll notice a lack of control on the turns.

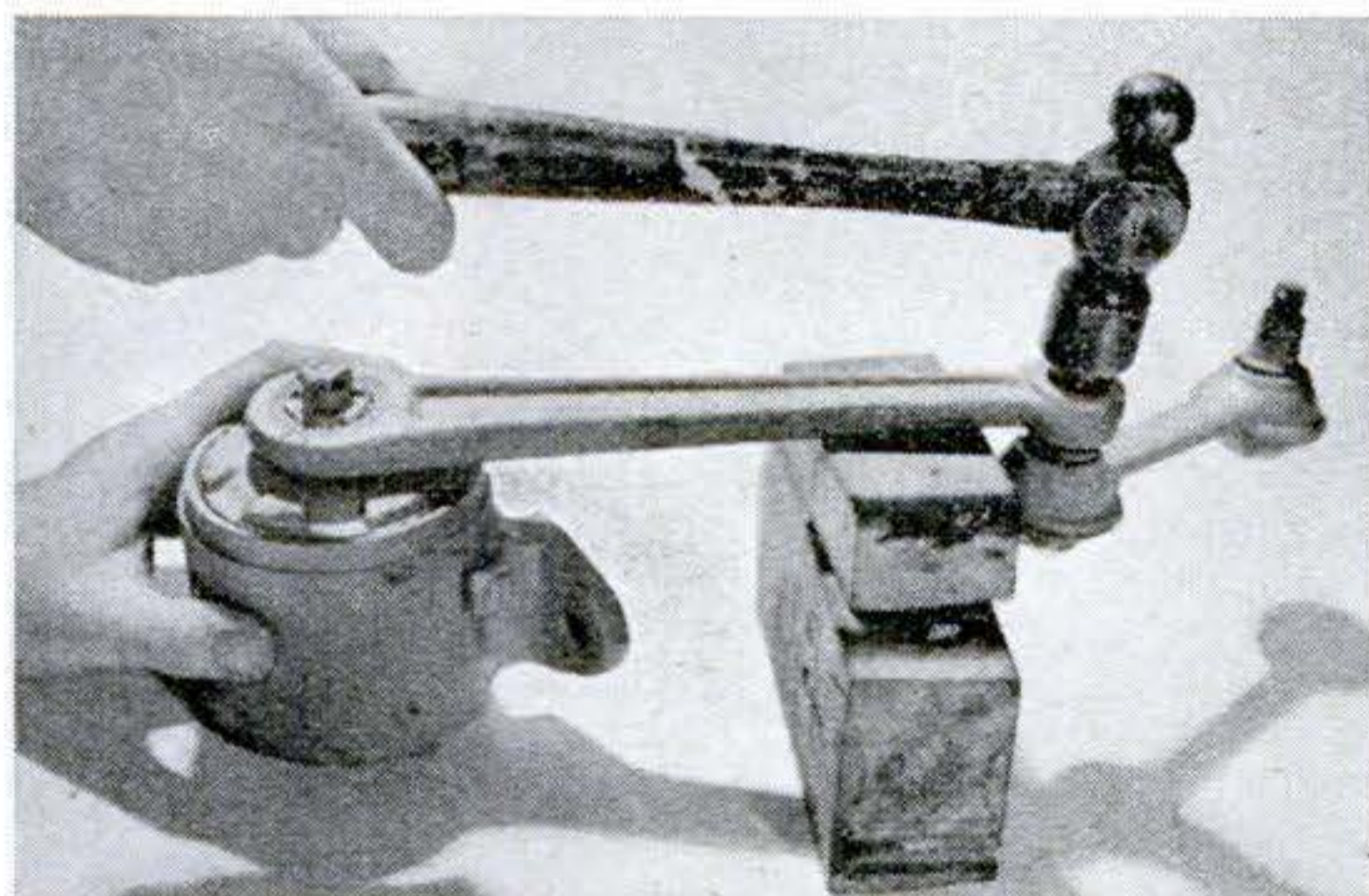
**The brakes are erratic.** Wheels dancing off rough roads are not sure-footed car stoppers. Good braking requires good friction between the tires and road surface.

**The wheels shimmy.** Unbalanced shocks can cause this.

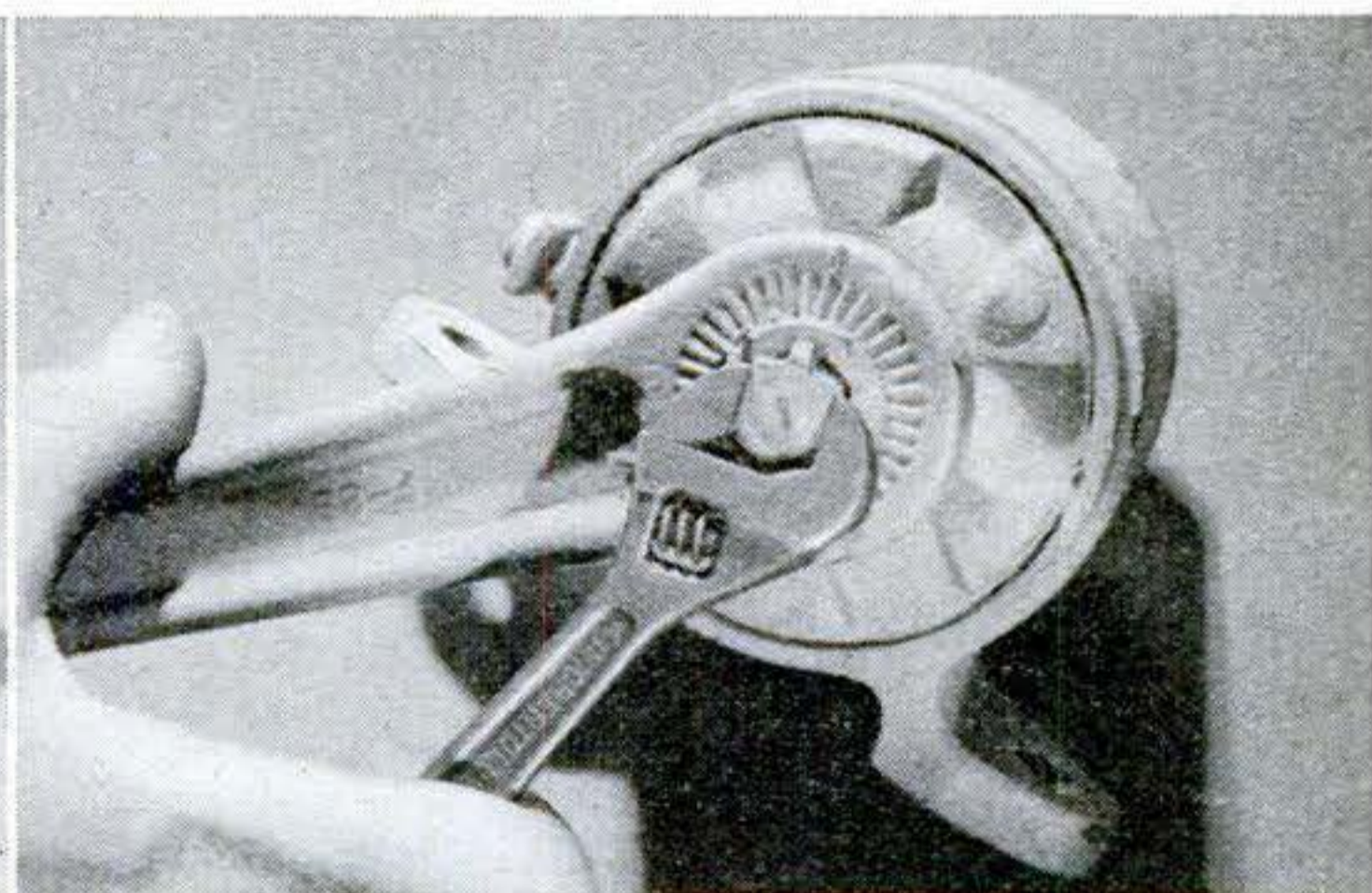
**The shocks become noisy.** But don't let a clunking sound from direct-action shocks throw you off when you start up on a cold morning. That is caused by thick fluid.

pushed just so fast and no faster. The harder the push, the more energy must be spent on fluid friction. And that, after all, is just what you want—a place to soak up recoil energy other than the car frame and seat of your pants.

All modern shock absorbers work on this



**ROTARY-VANE SHOCK** was common on older Fords. When rubber bushings wear out in the links, the car sounds like a trolley with square wheels. On vane shocks, a nut draws a tapered shank on the link into a precision seat in the arm. This assembly can be very tight. To loosen, back off the nut. Then use it as a hit-



ting surface to break the taper grip (left above). To adjust these shocks for a softer ride, turn the indicator clockwise (right above). Move indicator about 1/32" at a time and road-test the car until the desired ride is obtained. Shock is shown removed from car for clarity. Adjustment is easily made on car.

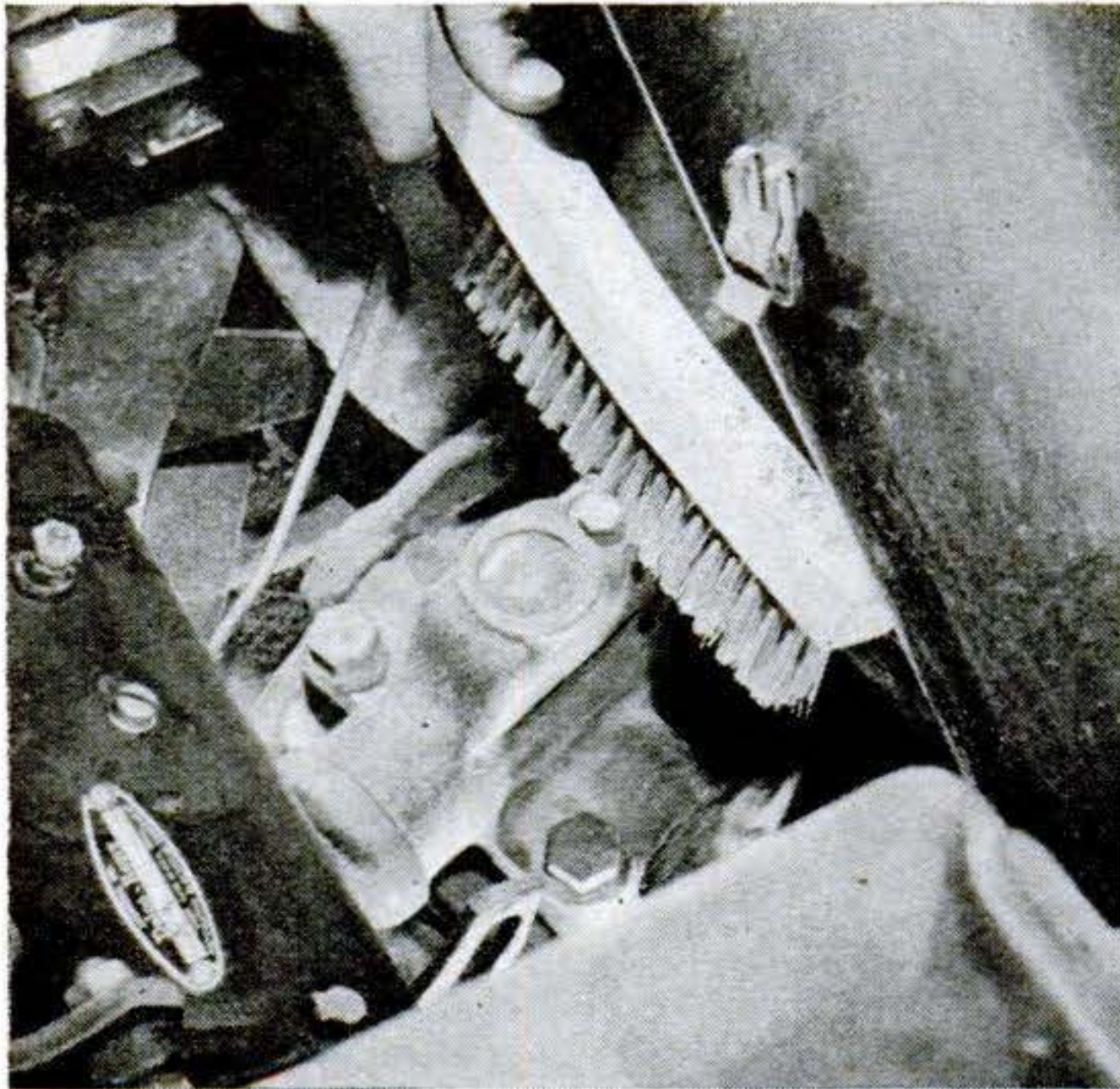
same hydraulic principle, regardless of the shape and external appearance. But a variety of different details—external and internal control valves for instance—make service and maintenance a highly individual proposition.

Cars now on the road have four distinct types of shock absorbers. A few years ago

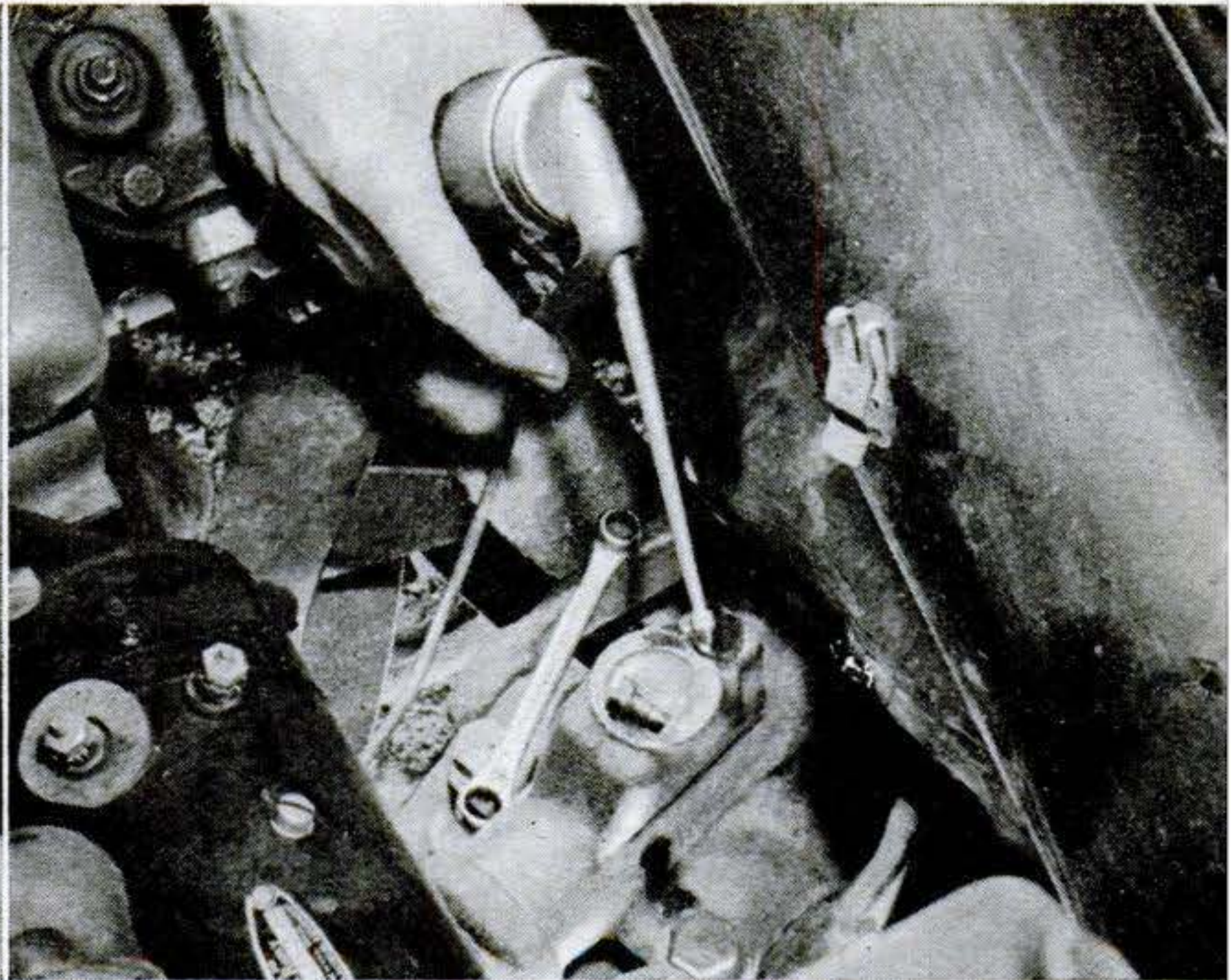
the single, double and rotary (or vane) types began giving way to the direct-action or airplane type. New cars now are most likely to have the direct type, although a couple are still holdouts for the more intricate external-arm shocks.

**Refilling shocks.** Without the correct amount of fluid, shock absorbers can't do

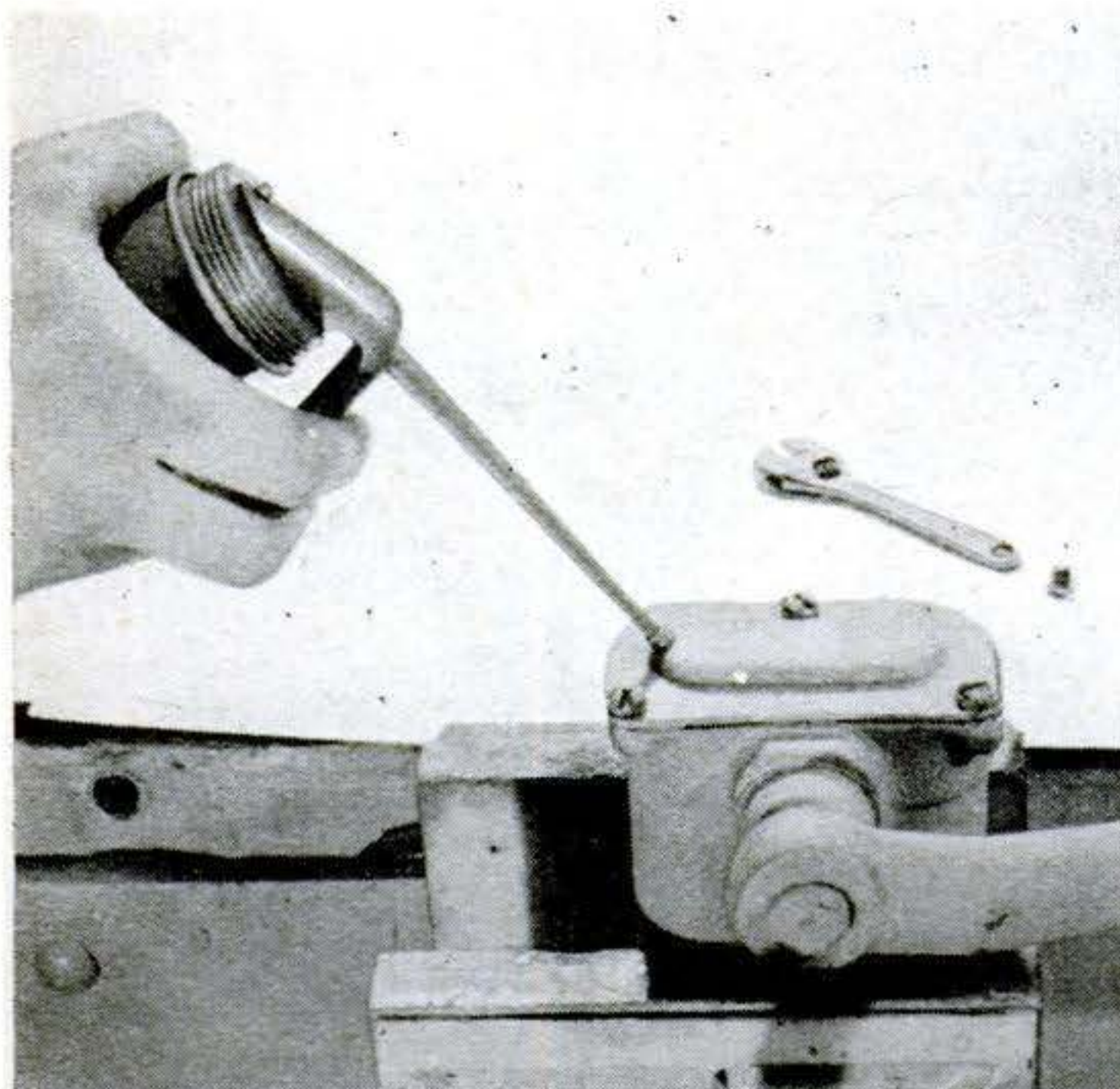
## How to Refill Your Shock Absorbers



**1 CLEAN AWAY DIRT** with wire brush and cloth before removing plug. Dirt inside can ruin shock. Double-arm front shock like this should be kept completely filled with fluid. Others may vary. Learn volume yours need.



**2 USE CLEAN SQUIRT CAN** and fluid recommended by shock manufacturer. Cheap fluid is sometimes poor economy. It may not be suitable for the job in both hot and cold weather and may gum up and rust valves.



**4 HALF-INCH AIR SPACE** should be left in fluid chamber when filling parallel-cylinder rear shocks that are mounted vertically (above). For cylinders mounted horizontally, fill to hole level. Cover is removed to fill some.



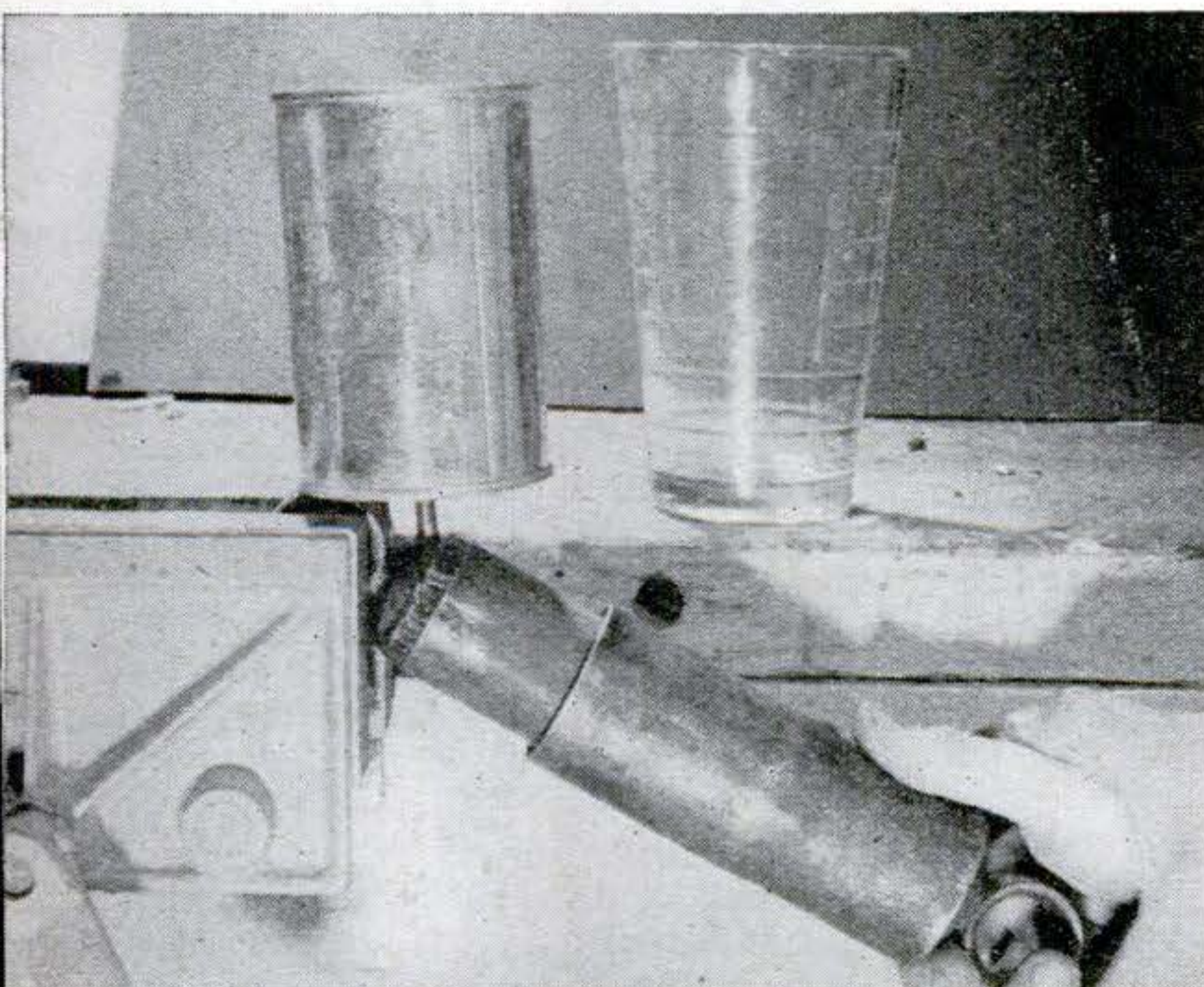
**5 FLUID VOLUME IS CRITICAL** in direct-action shocks. Consult chart before monkeying with these, or you may overfill them. If it's the plug type, pump out all old fluid by telescoping shock back and forth by hand.

their job. So checking the fluid and refilling the unit when necessary should be a regular point of maintenance—once a year.

Nearly all of the older shocks have a convenient plug for adding fluid, but more and more of the newer direct shocks are filled for life. When these go bad, you have only one choice—replace them.



**3** **ROCK CAR** after putting in fluid, leaving plug out so air can vent. This may draw fluid down into shock and indicate need for more. Continue to alternate filling and rocking until no more fluid will go into reservoir.



**6** **EXACT NUMBER OF OUNCES** specified for particular shock must go in without spillage. Writer soldered a drilled  $\frac{1}{4}$ "-28 cap screw to hole in can bottom, turned screw into filler hole, and pumped full charge into shock.

But simply because you find a filler hole, don't make the mistake of thinking all you have to do is pour in the fluid. In refillable direct-action shocks, that would be fatal. These all demand a specific amount—and no more. In some of the control-arm shocks, you also must leave an air space in the fluid reservoir.

Like many other auto jobs today, refilling a shock often requires special equipment—in this case a special squirt can with a flexible neck. I have usually found it easier to remove the mounting bolts and take the shock into the shop. While filling a shock, work it to drive out air bubbles. And listen for harsh grating, a sign of worn valves.

**Look for leaks.** If a shock needs fluid, it is natural to suspect there may be a leak. If leakage has been rapid and severe on a direct-action shock, fluid and dirt will form a gummy mass on the exterior. This means the fluid seal is worn out. With new shocks installed, a small amount of excess fluid may work out. This is normal.

**Rubber bushings.** Never lubricate these, no matter how strong that urge to oil everything in sight. It is the best way to knock the life right out of them.

Rubber bushings in good condition determine to a large extent how quiet your ride will be. New ones should always go right along with any shock replacement.

**Replacing direct shocks.** These are usually less costly than the others. But there's a joker. They need replacement at about 15,000-mile intervals—in contrast to the 25,000 or 30,000 miles that could be expected from external-arm types. New spring designs, softer and less rugged tires, and generally lighter body structures demand that direct shocks do more work.

But replacing them is easy. No special tools or skills are needed and the whole job shouldn't take longer than an hour. By doing it yourself, you save about a buck per wheel on labor charges, perhaps more.

The big trick before getting into the job is to find out which shocks should be replaced. A surprising number of shocks are replaced needlessly.

There are three common tests:

**Jounce test.** Put a foot on the bumper and give a lusty thrust to start the car rocking on one corner. Or lift up to start the rocking motion. With older shocks, watch to see that there is enough resistance to prevent bottoming and that the rocking action stops quickly when you cease to apply

force. Weak shocks are indicated by continued rocking.

This old test still goes for most shocks, but the Chrysler Corp. says it's no good for the new Oriflows. For these, try the driving test.

**Driving test.** This calls for some judgment by the driver. Drive at a fairly high speed over rough roads to check for resistance under *high* piston speed. Then try a smooth ride to see what happens when the shock piston is moved slowly.

**Bench test.** Here the idea is to clamp the shock in its working position with one eye or end in a vise and apply hand pressure to extend and compress the shock through its full range. If you unhook one end of the shock under the car and work it in its correct general position, you can also learn the same thing.

Chrysler engineers say that testing an Oriflow by hand on the bench also tells you nothing because it feels weak when the piston speed is slow—as it is with hand pushing. But the bench test works for others.

Before deciding that your shocks are good or bad, you will do well to check what a good one feels like. The easiest way is to find one the right size and model in an accessory store and, after bleeding it, try its trombone action.

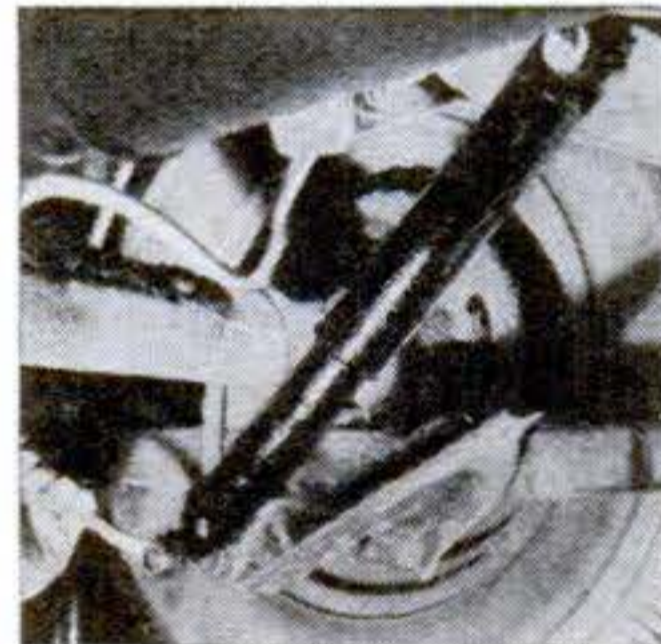
Even good mechanics sometimes go wrong. A major car maker recently advised its dealers that many direct rear shocks being returned to the factory as defective were perfectly okay. A swishing noise heard at certain times when a bump forced fluid through the valves at high velocity had been mistakenly diagnosed as indicating a defective shock. END

### Tips on Servicing Direct-Action Shocks



**BLEEDING** is standard requirement for shocks that have been stored horizontally. This position allows air to seep into fluid chamber. Before installing, hold shock in upright position and extend to full length. Then turn end for end and close to minimum length. Repeat this several times. Do not extend shock while holding it upside down, for this would fill it with air. After bleeding a shock, install it at once—without laying it down, or air may get into the fluid chamber again.

**REMOVING** and installing eye-type direct shocks is mostly a matter of loosening and tightening nuts. Be sure you have correct shock for your car. Even though shock fits, it may not be engineered inside to suit your car. Use new rubber bushings, seat them properly in the eye with the big washers that keep them in place, and make sure studs and support brackets are snug. If shock has stone shield on bottom tube, shield should face toward the front end of the car.



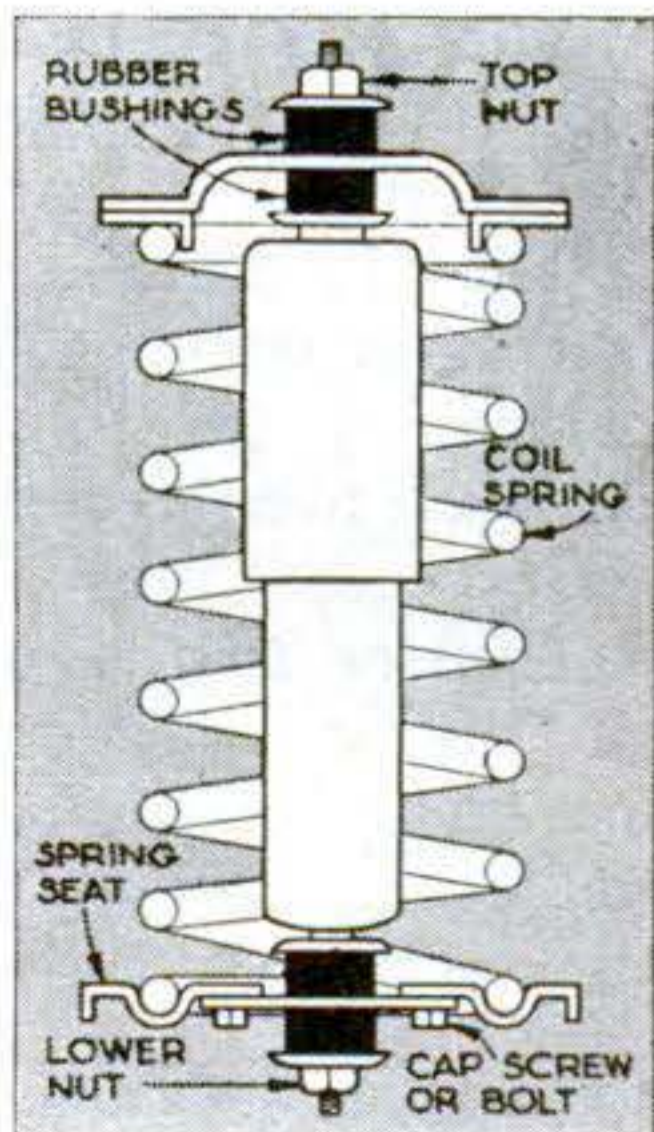
**FRONTS AND REARS** should not be mixed up. Rear shocks are usually longer and show more resistance on extension than compression. But even on extension they have less resistance than the fronts because the latter must do the same work in a shorter stroke. For that reason, don't discard a rear shock because it has less resistance than a front one.

**REPLACEMENT KITS**, including everything you need to convert from external arm to direct-action shocks, are a good bet when the more expensive external-arm type go bad. Doing the work yourself, you can equip an older car with a full set of direct shocks for around \$15. Be sure to get a kit made for your specific car.

**A SLOT IN THE COVER** is a sign the shock can be taken apart. If this must be done for refilling, a new seal should be installed—and this amounts to rebuilding the shock, a job that is not too easy unless you have special tools. Cleanliness is an absolute must, as is care not to mix up the small parts. All in all, better leave this work to the experts or just install a new shock when you have checked the old one and found it bad.

**REBUILDS** are a gamble. If you take a chance on them because of lower price, try to stick to a shop in which you have full confidence.

**A COIL SPRING** around a shock may seem like a problem, but shock can be removed for replacement this way. First take off the top nut and washer. Then remove the cap screws that hold the retaining plate to the seat at the base of the spring. You then can work the shock out of the spring by pulling down. Take off lower nut and install retaining plate on new bayonet-type absorber along with new rubber bushings.

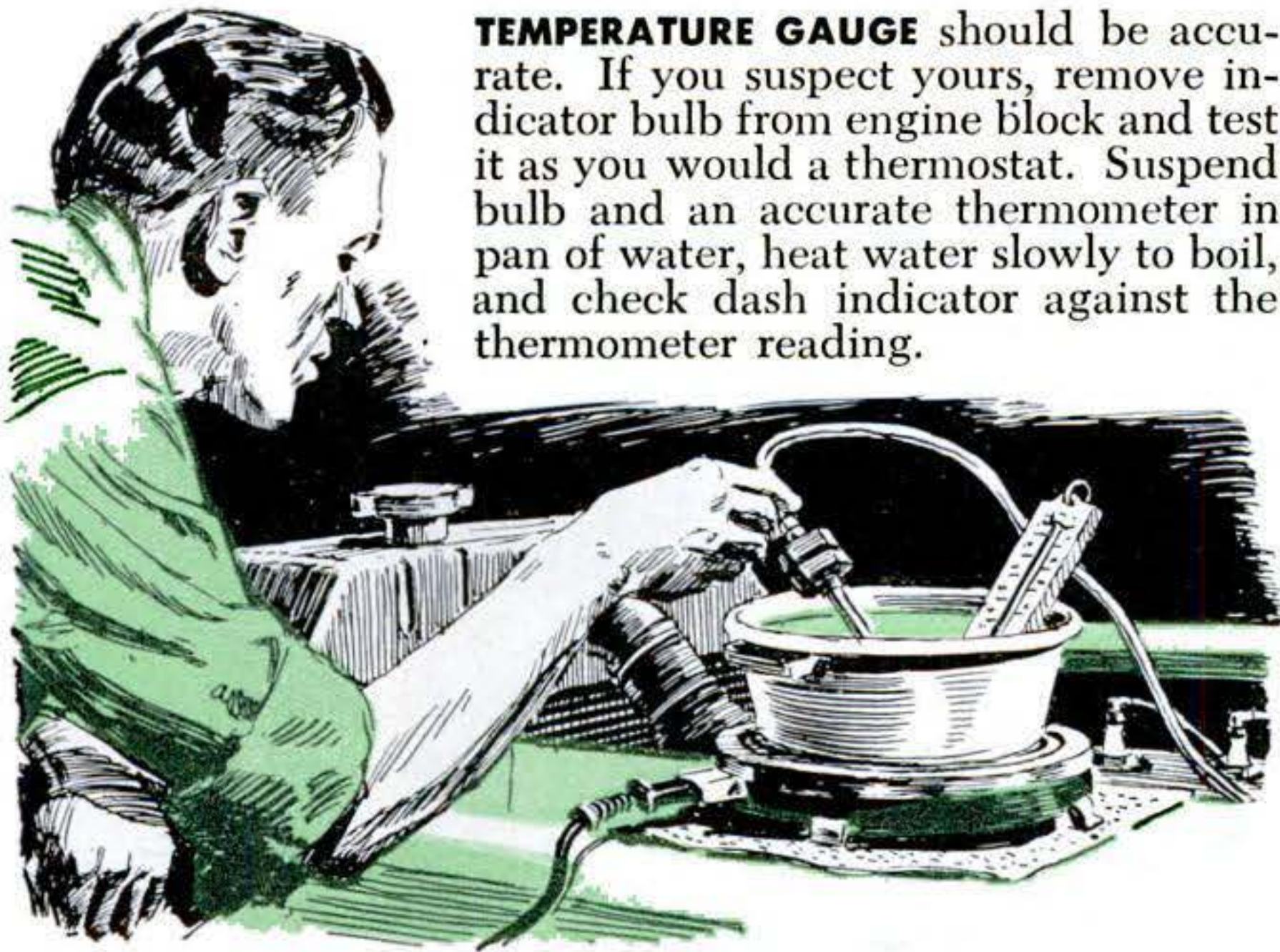


# Summer Cooling-System Tips

**PROLONGED HIGH SPEEDS** on a hot day can cause overheating, even though engine is in good shape. So keep an eye on temperature gauge during fast runs, and slow down or park briefly if pointer climbs dangerously.



**CRACKED CYLINDER HEAD** or block, usually associated with freezing, can occur in summer too, especially if you add water to overheated engine. Small cracks can be brazed or welded.

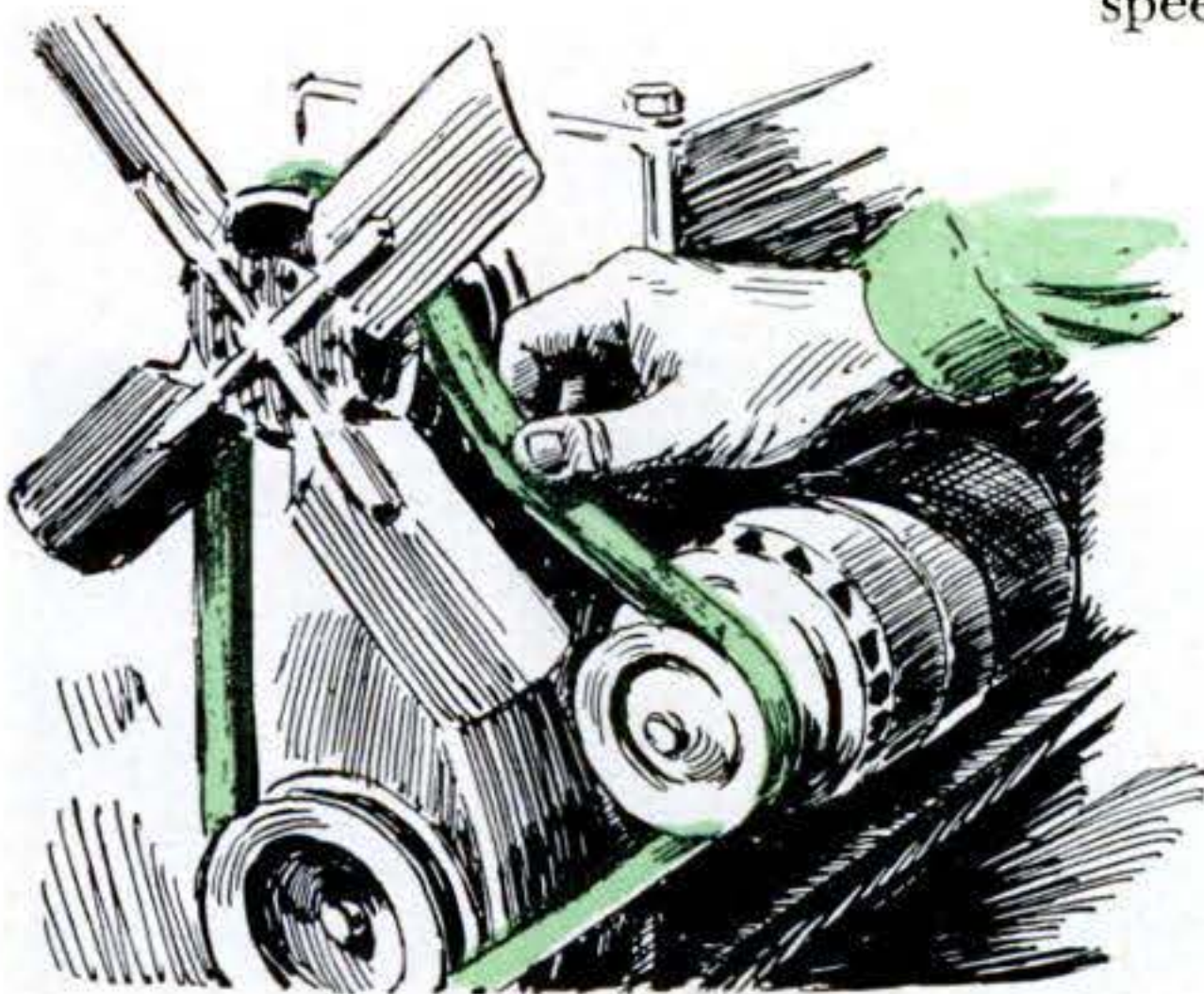


**TEMPERATURE GAUGE** should be accurate. If you suspect yours, remove indicator bulb from engine block and test it as you would a thermostat. Suspend bulb and an accurate thermometer in pan of water, heat water slowly to boil, and check dash indicator against the thermometer reading.

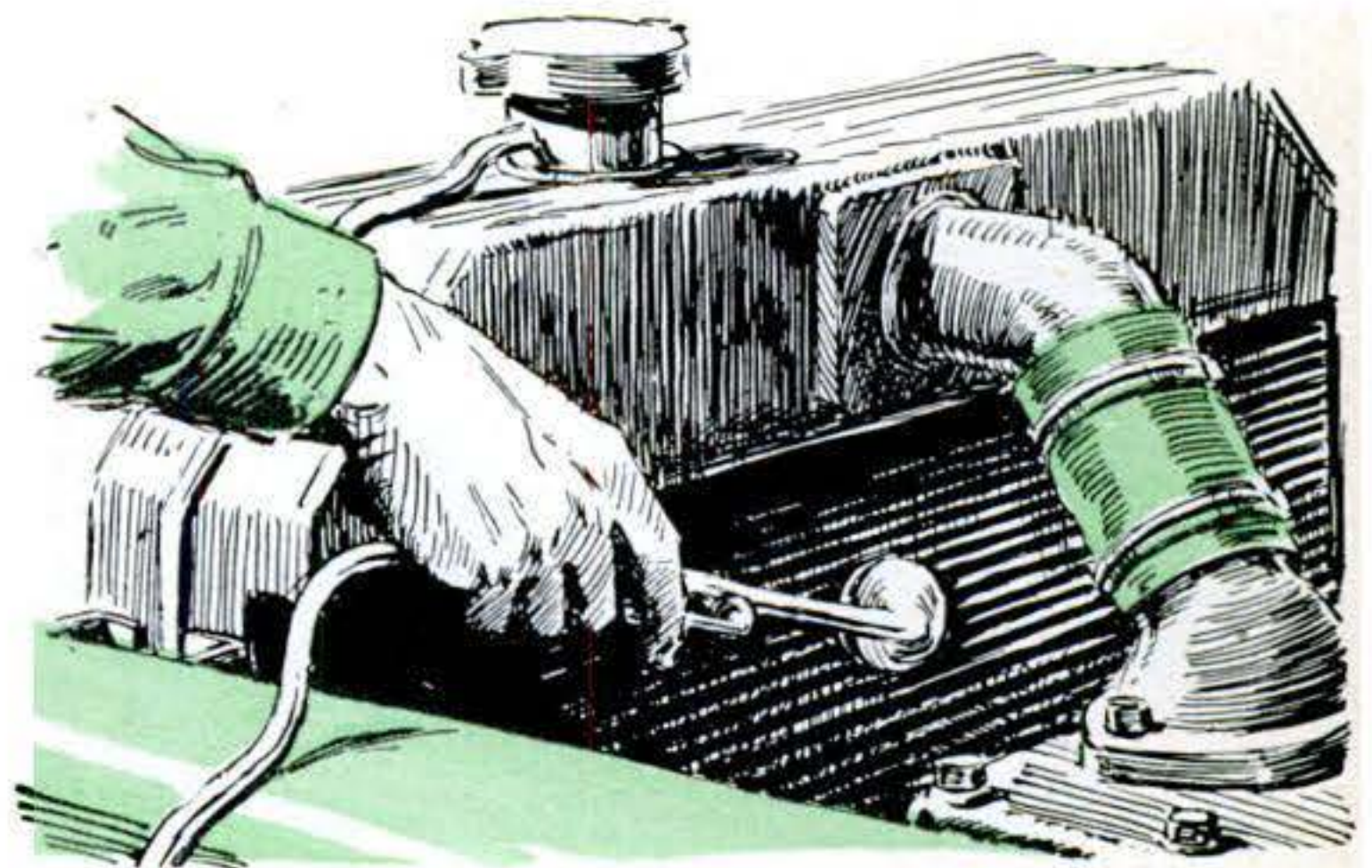
**LET ENGINE IDLE** for a few minutes when you stop after a hot run. Standard practice with aircraft engines, this prevents injury from over-rapid, uneven cooling, especially serious in and around exhaust valves.



**A TAIL WIND** may cut down the air flow through the radiator so much that the engine overheats. Winds that equal the speed of a car (or exceed it) are not unusual.



**FAN-BELT TENSION** should be adjusted so that belt will give about an inch when pressed at a point midway between two of the pulleys. Overtightening will cause the belt to wear rapidly.



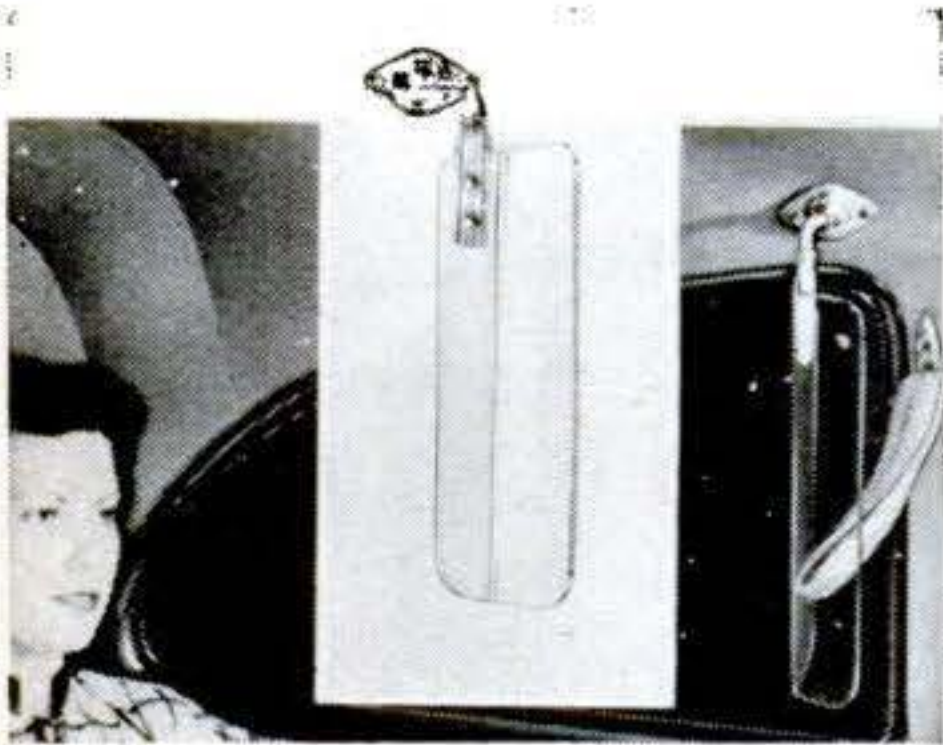
**CLOGGING OF RADIATOR FINS** by insects or debris causes overheating. To clean, direct air or water hose forward from back of radiator core.

# New Trappings for New Cars

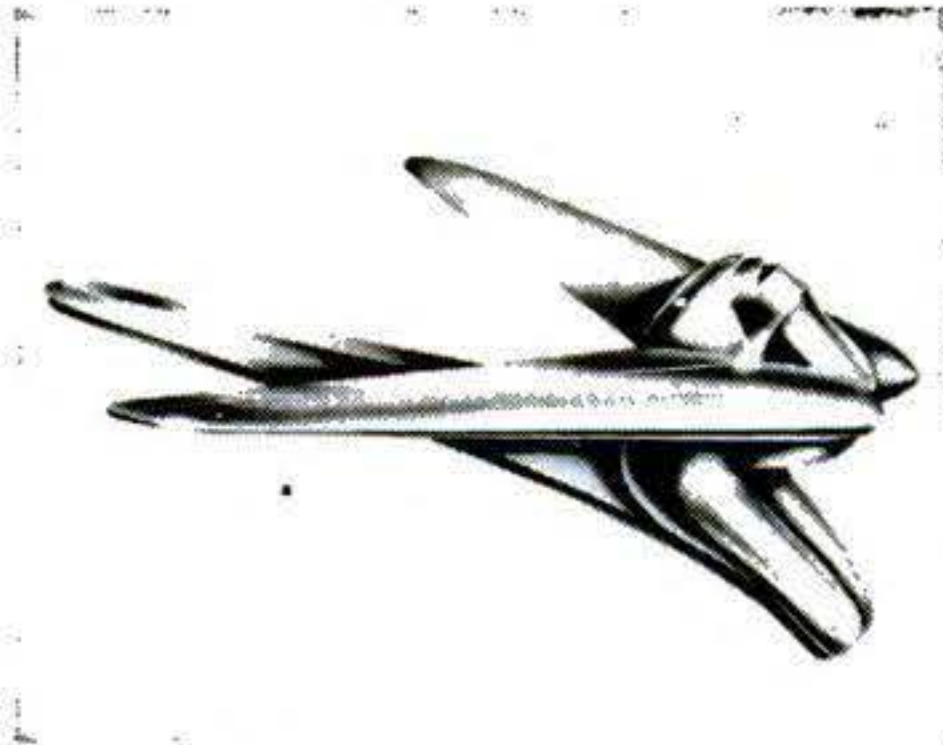
**Auto dealers, like druggists, can sell you almost anything—from folding umbrellas to rain hats for convertibles.**

A YOUNG woman stepped into a big auto showroom the other day, strolled past the glittering new cars with scarcely a look, and asked to buy an umbrella.

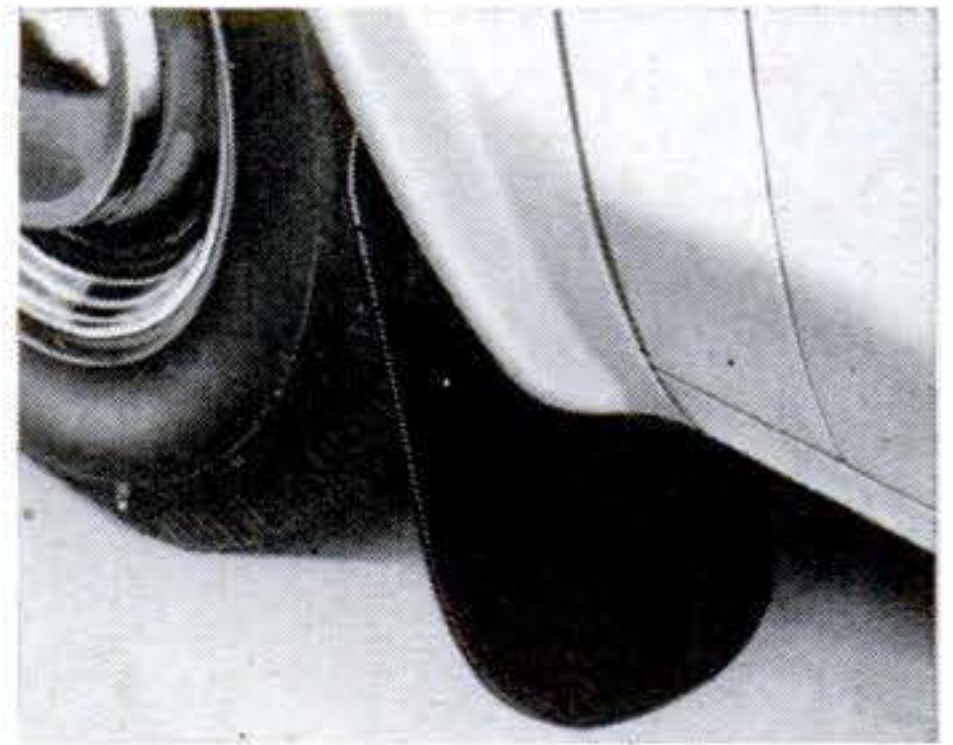
Umbrellas that fold to fit into the glove compartment are just one of the items now displayed among factory-approved auto accessories in many showrooms and garages. In the past few years, these gimmicks have expanded into a drugstore variety. When you buy a new car, the salesman may hand you a list of as many as 70. Here are a few.



**DRAFT DEFLECTORS** keep front-window breezes away from rear passengers in Pontiacs, Kaisers.



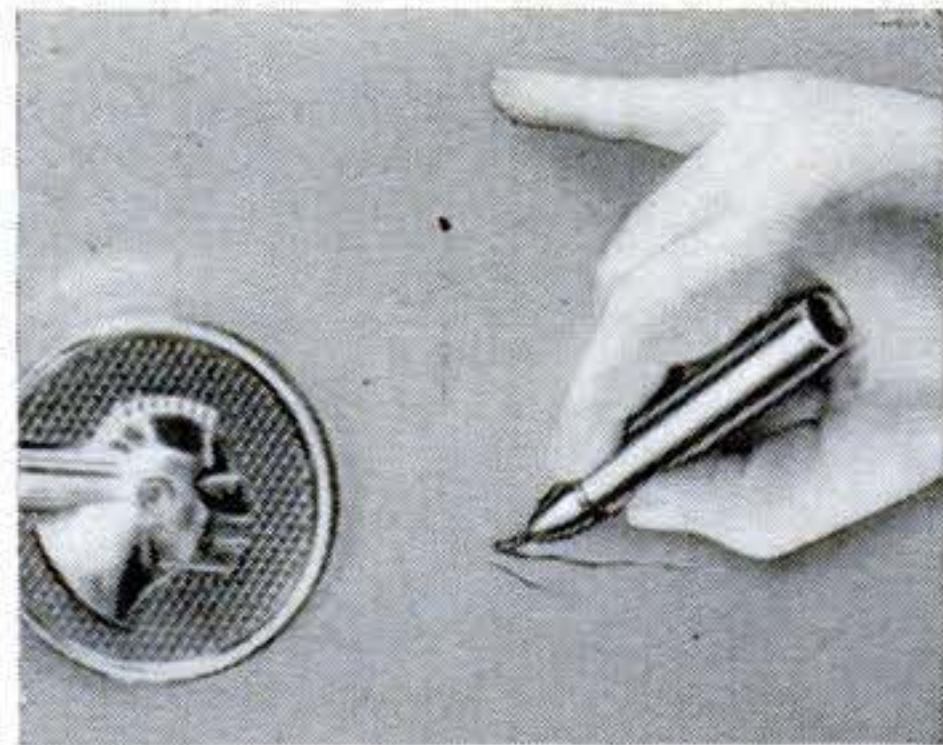
**PRETTY GIRL ORNAMENT** graces '52 Nash hood. Ornament for another car has light inside.



**RUBBER GUARDS** fitted behind front wheels keep stones and oil from marring Studebaker.



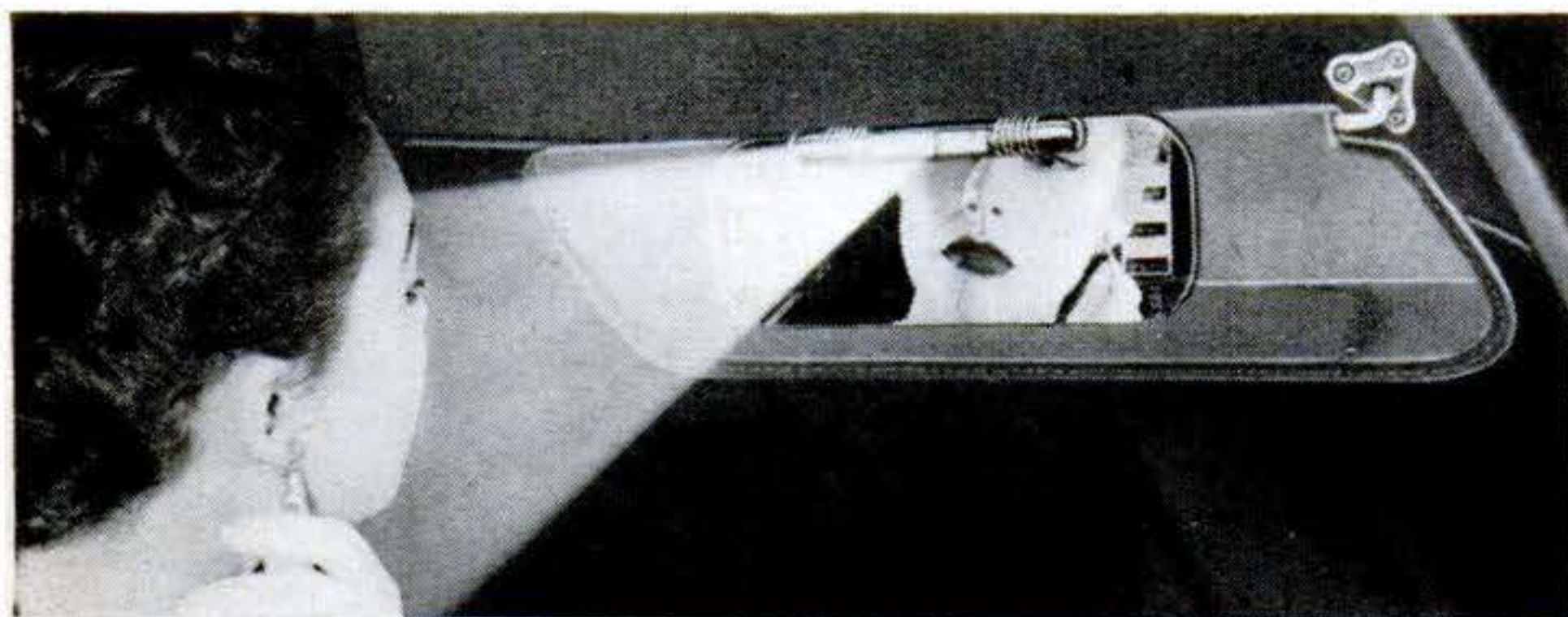
**CLOTHES HOOK.** Larger than standard garment holders, this one will take up to six hangers of clothes. When not in use, it folds up against the headlining of the car. Pontiac and Kaiser offer it.



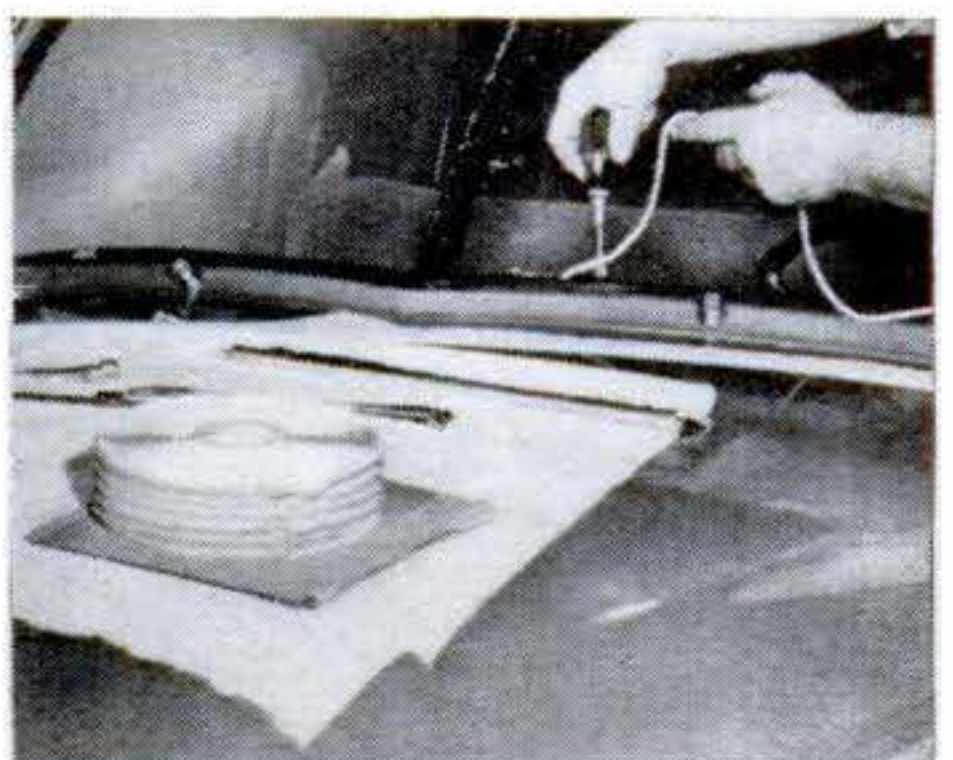
**PAINT IN A LIPSTICK** container can be bought by Pontiac owners to match the body color. When you remove the cap, paint flowing from the brush tip will touch up any scratches on the original finish.



**RAIN COVER.** Studebaker-convertible owners can slip a water-repellent fabric cover, with a transparent rear curtain, over the regular top. The top can be raised and lowered without removing the cover.



**A VANITY-MIRROR LIGHT**, for attachment to the back of a sun visor, is powered by a tiny pencil-type flashlight battery. The Ford and Studebaker companies offer this accessory. Chevrolet has a similar vanity light, but it wires into the regular car circuit instead of using power from its own battery.

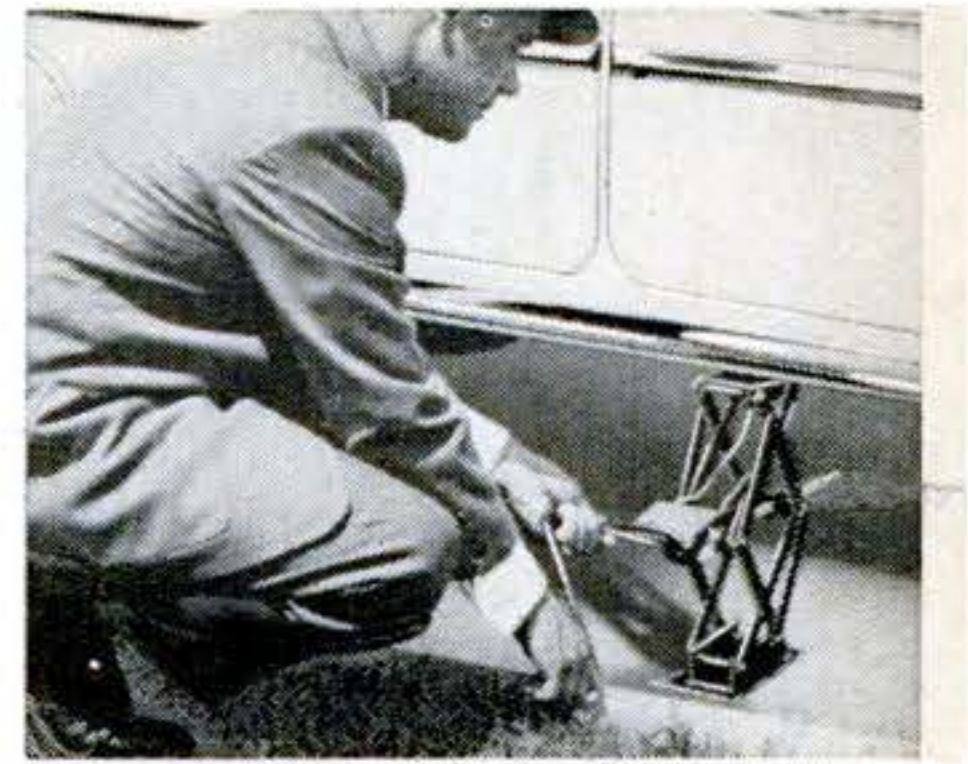
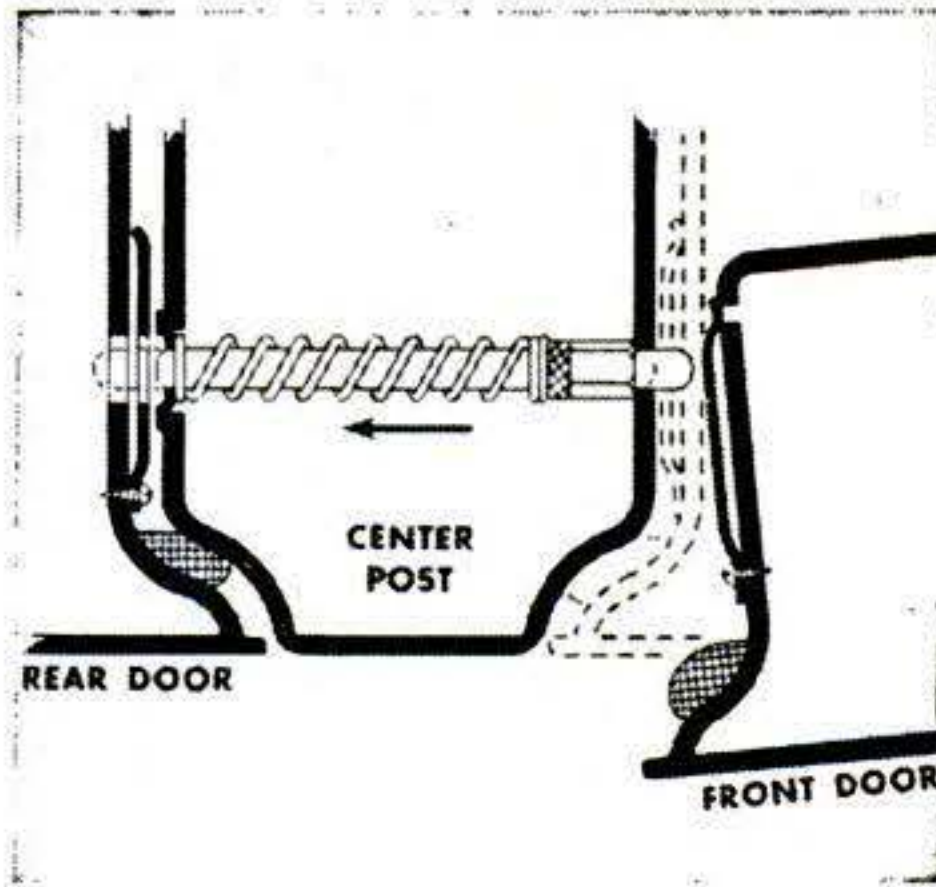


**A PUTTY-LIKE MATERIAL** in cord form, sold by Kaiser dealers, can be used to seal water and air leaks around the windshield or other car parts.





**A SAFETY LOCK** carried by Studebaker and Kaiser dealers protects children from falling out of the rear doors of sedans. A spring-loaded plunger through the center post keeps the rear door locked until the front one is opened. With the front door open, the rear one can then be opened normally. When the safety feature is not required, the plunger can be locked so that closing the front door does not engage it.



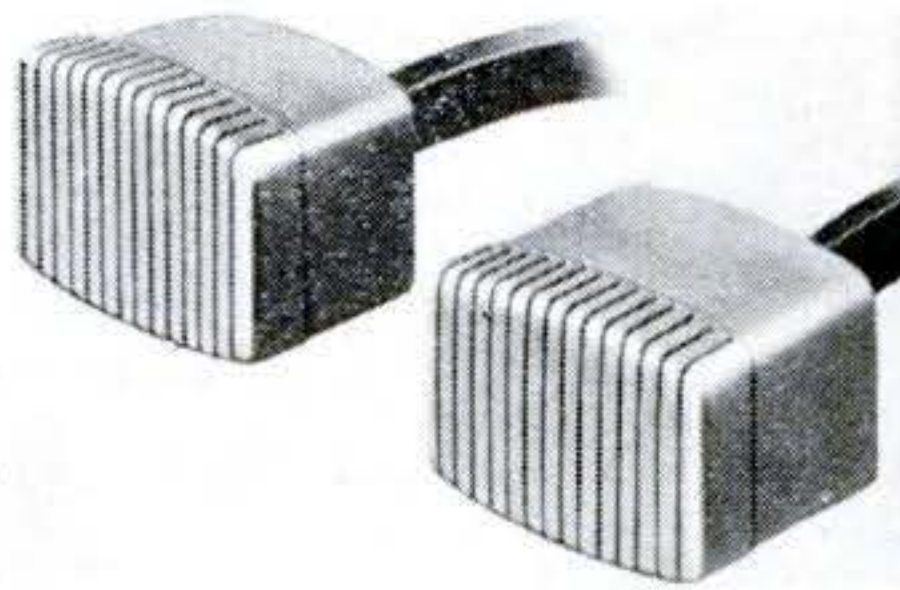
**SIDE JACK**, set under frame, lifts both wheels on one side off the road. Pontiac has it.



**JACK CASE** keeps parts of a bumper jack from rattling around. Buick dealers carry it.



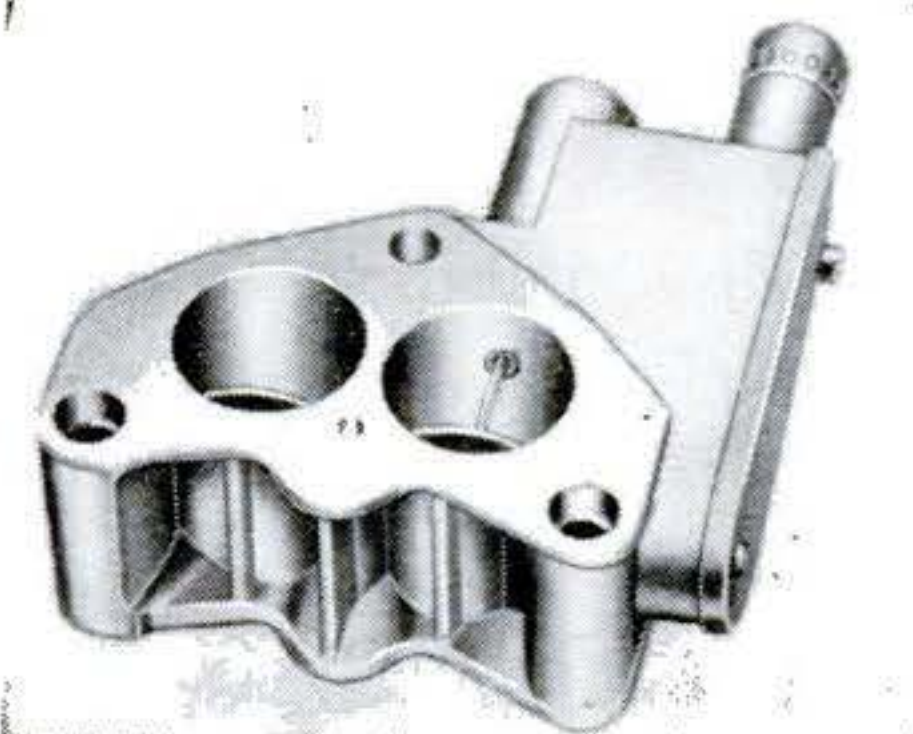
**ELECTRIC LOCKING CAP** for the fuel tank is a Chrysler Corp. accessory. A button on the dash flips the cap open when you want to fill up. Some other cars have a lock for the gas-tank door in the fender.



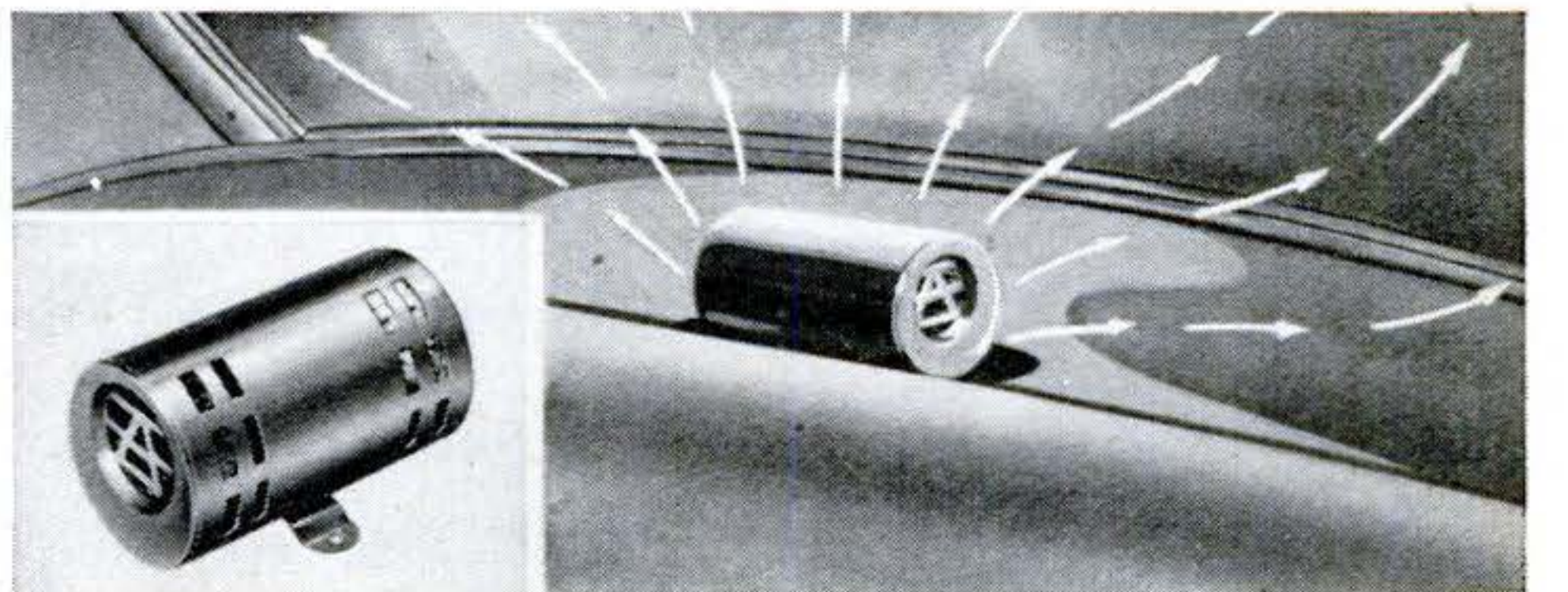
**FOR SHORT DRIVERS.** Extensions add an extra three inches to the brake and clutch pedals, making them accessible to drivers who must stretch a bit even with seat fully forward. They are available from Pontiac.



**AN ACCELERATOR PAD**, made of rubber, has a round extension that keeps your heel from wearing a hole in the floor mat. Chevrolet, Studebaker, Packard, and all Chrysler Corp. cars have this accessory.



**ENGINE GOVERNOR** is available for late Fords. It keeps engine speed from exceeding a predetermined maximum and reduces gas and oil consumption.



**AN AIR CIRCULATOR**, mounted on the package shelf and controlled by an instrument-panel switch, helps clear steam or frost from rear window. Kaiser dealers have it. The same dealers also offer a fabric package-shelf cover that reduces glare when the bright sun reflects off a polished metal shelf.



# Gus Warms Up a Road Racer

A little English sports car with a bee under its bonnet breaks up Gus's quiet Sunday morning.

**By Martin Bunn**

**T**HE knocking on the door sounded far away, coming from some remote corner of a dream. Gus Wilson rolled over and buried his head in the pillow, but the knocks came again, insistent and louder. Gus struggled to a sitting position and squinted at the old alarm clock by his bed. It was seven a.m. and Sunday.





*"Please help us!" the girl pleaded.*

*"My brother, he's been hurt—"*

"Come back this afternoon!" he called out.  
"It's urgent."

Gus groaned. "Okay, okay. Just a second."

He muttered his way into a beat-up bathrobe, slid his feet into slippers and scuffed to the door. A big man with a fiery red mustache stood in the hallway.

#### ***Race Driver Tells Tale of Woe***

"I say, I'm terribly sorry to disturb you at this beastly hour, Mr. Wilson, but I'm in a bit of a fix!"

Gus blinked, and wondered foggily what an Englishman was doing at his door.

"C'mon in." He motioned him to a chair and plugged in the hot plate.

"Coffee?"

"Thank you, no. C.T.V. Pinkerton is my name. Everyone I spoke to in town recommended your work. You see, the sports-car races up at Wicker Creek Road start in just two hours, and my MG is acting strangely. Mr. Wilson, money is no consideration. I'll

pay whatever you ask. I just jolly well don't want to miss that race!"

Gus was feeling a little better as he sipped a cup of coffee. "Well, let me get my clothes on and we'll have a look. What time did you say the race starts?"

"The race itself begins at 10. But qualifying trials start at nine, and they're part of the entry requirements."

Not quite two hours, and Wicker Creek Road was 15 miles north of town. Gus dressed hurriedly and they went downstairs.

#### ***Gus Admires a Rakish Roadster***

The brilliant red MG squatted low at the curb. It was an older model, a TC, and its jaunty length of hood, spoke wheels and continental flavor were something to admire. Gus lifted one side of the hood.

"What seems to be wrong, Mr. Pinkerton?"

"Well, while I was driving slowly through a small town south of here, she started spitting and missing. The beggar acted cold, and actually was running warm!" Pinkerton



started the engine, and the exhaust rumbled smoothly.

"Now listen to that, will you? She runs fine now. That's the way it's been going. Good one moment, bad the next."

Gus checked the plug leads, the distributor connections and didn't find anything loose. On the other side, he studied the twin carburetors.

"All I've found so far is a small radiator-hose leak. When was the last time you had the carbs cleaned and adjusted?"

"Just the day before yesterday. Tried a spare set of plugs, too. No improvement."

"Okay. Let's take her down to the shop."

#### **Mr. Pinkerton Steps On the Gas**

They drove to the Model Garage and before long Gus was reading dials on the engine tester. There was nothing abnormal.

"Look at that. The vacuum gauge shows 21 inches of mercury. That's good in any language. So, with time short, all we can do now is take her out on the road. Just drive as you did last night."

"Righto!"

At the edge of town, Pinkerton began stepping hard on the accelerator. Gus watched the needle slide up until it hung on the upper lip of 80.

"How fast do you turn a racing course, Mr. Pinkerton?"

"Depends. I understand it's a two-and-a-half-mile course at Wicker Creek. I should judge about two minutes or so. The hotter machines, Jaguars and Allards, for example, do it in much less."

Gus pictured the narrow twisting little road that circled the picnic grounds.

"That fast?"

"Oh yes. These beggars hang on in the corners like footprints in soft asphalt. Allow me to demonstrate."

Gus grabbed his seat and tried not to believe the turn he saw cutting sharply to the right.

Pinkerton twisted the wheel, the tires began to scream and the car leaned slightly.

Gus waited for the inevitable loss of control, the spin—but the MG hung on and stayed with it like Grandma LuLu Belle out for a 15-mile-an-hour drive in her Teaboiler Eight.

#### **Gus Hangs On for Dear Life**

The Englishman's luxuriant mustache blew about wildly in the windstream as he turned to observe Gus's reaction. "See?"

Gus didn't attempt a reply. He kept a deathlike grip on the seat as they sped through several more turns. The engine didn't change a note.

"It's making a blinking liar out of me!"

The road led steeply down to another turn before rising over the next hill. Off the road, beyond the sharpness of the turn, was another MG, wrapped around a tree. . .

"I say!" Pinkerton squealed to a stop.

A girl was trying to move the driver from behind the wheel, crying as she tugged at the unconscious man. Then she caught sight of them and ran toward the car. "Please help us!" she pleaded. "My brother, he's been hurt—"

#### **Aid for a Damsel in Distress**

Pinkerton lent a hand, and when they got him on the grass, looked him over carefully.

"Nasty rap on the head. We should get him to a hospital right away."

"How'd it happen?" Gus asked the girl.

"Some fool forced us off the road. Wish I had his number. Bob tried to avoid him and—" She broke down again.

"Look, miss, get in my car. In the center on the drive shaft. We'll carry your brother over, put him in the seat, and you hold him as steady as you can."

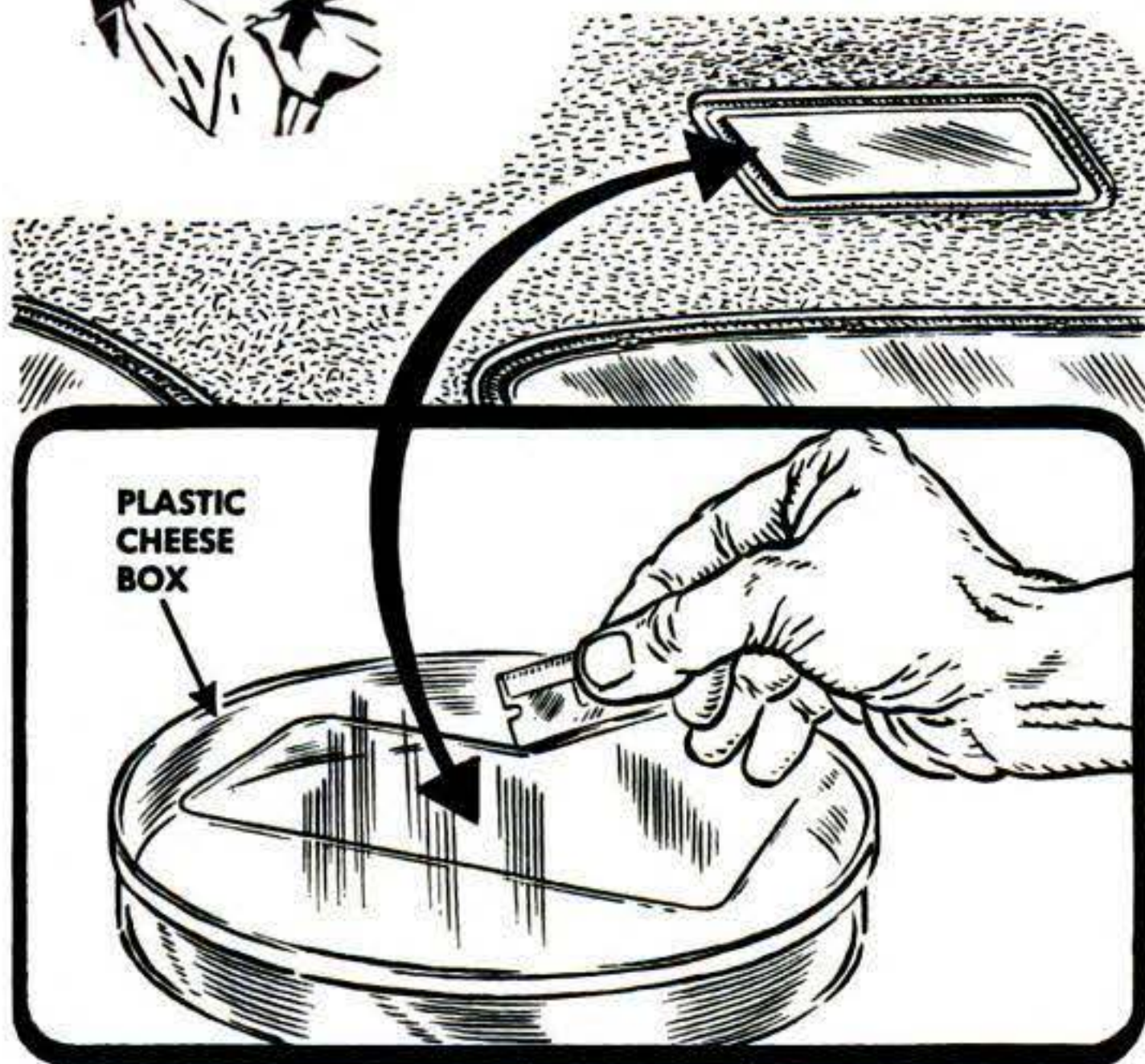
"Hold on," Gus put in. "I'm not so sure we should move this man at all. We'd better go get a doctor and an ambulance."

With an obvious effort at control, the girl turned to Gus. "Please, please," she begged. "Let's not waste time—let's get him to a hospital as fast as we can."

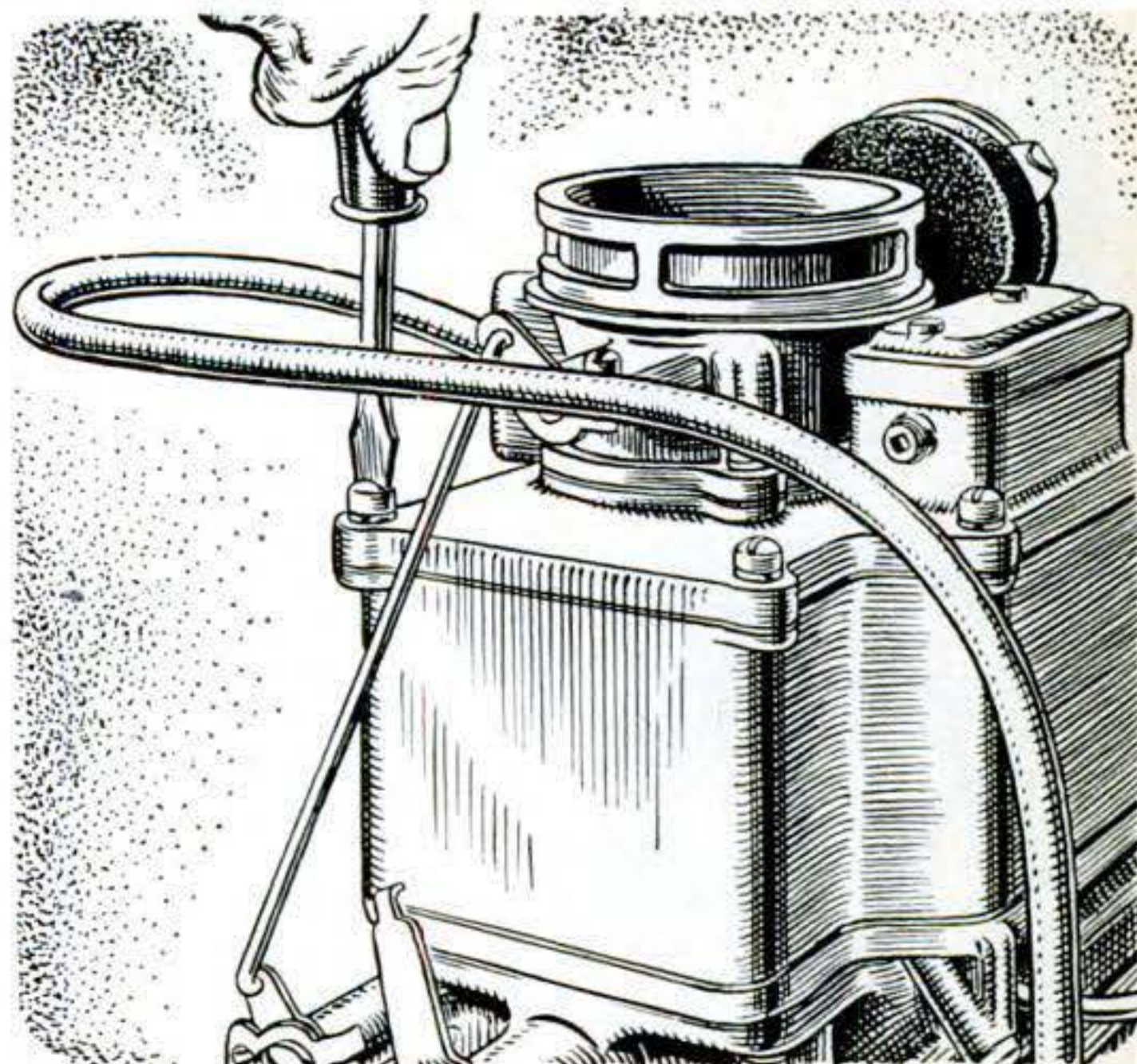
[Continued on page 219]



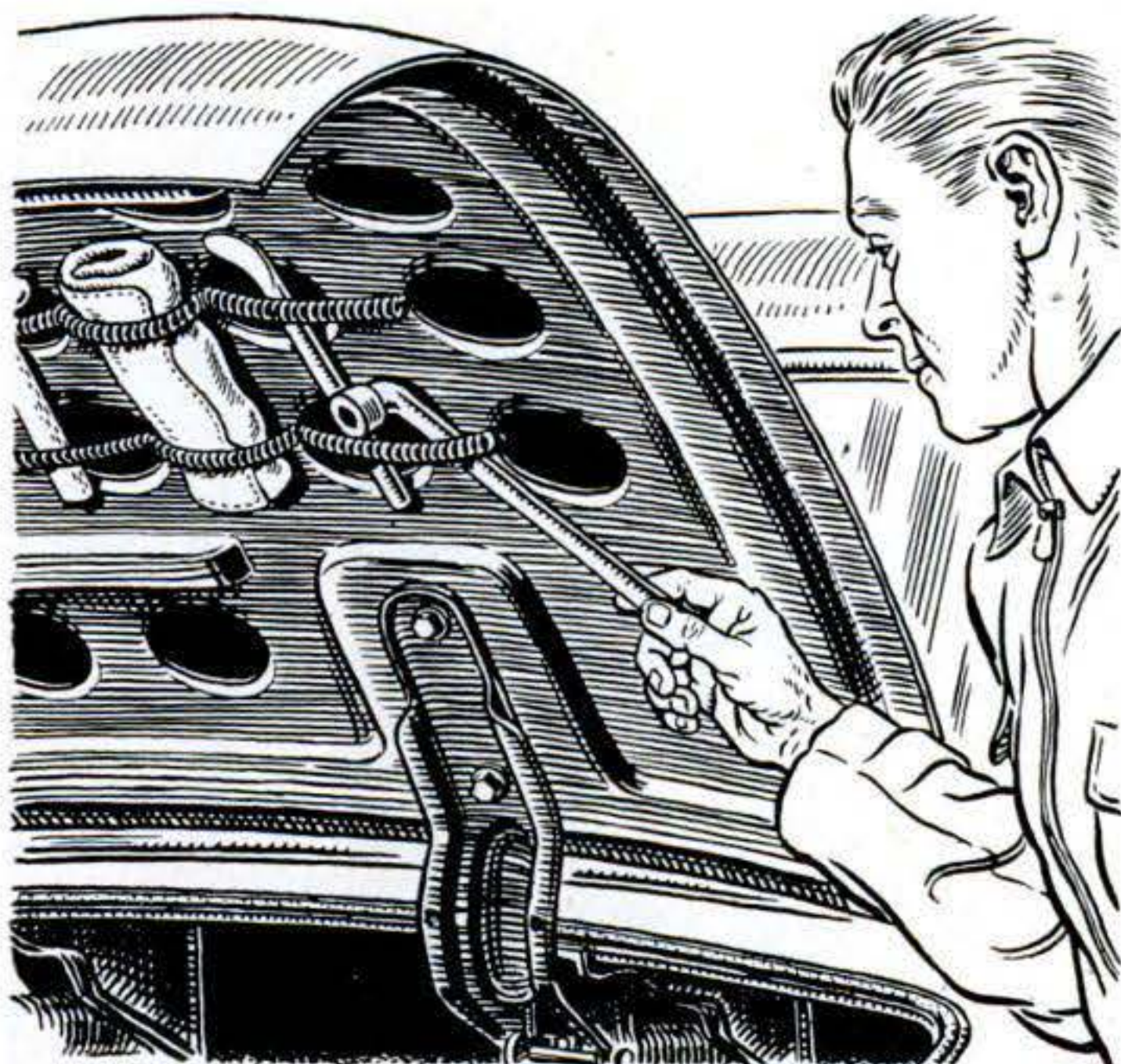
## Hints from the Model Garage



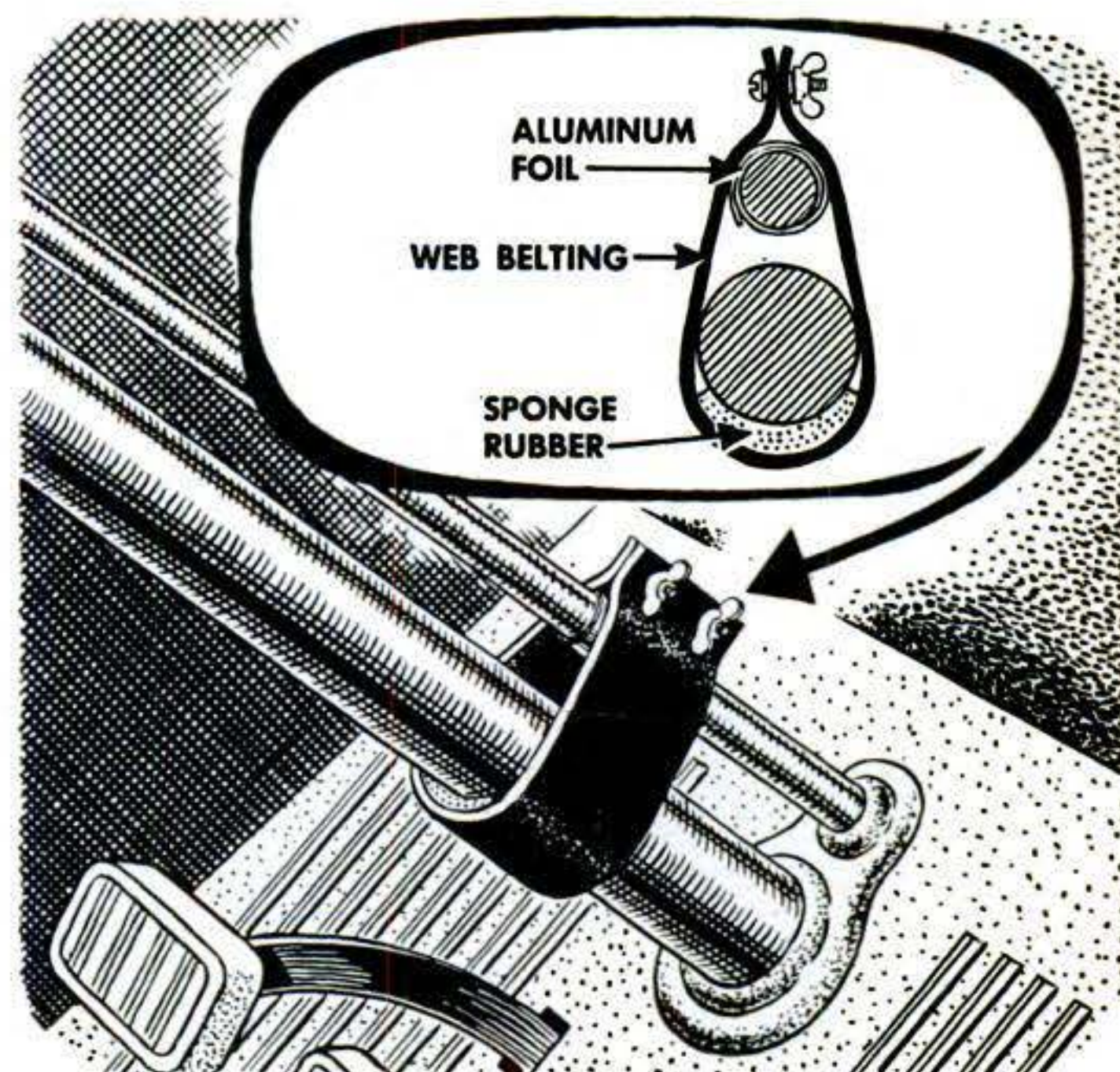
**A broken dome-light glass** can be replaced easily and inexpensively by cutting the desired size from one of the plastic containers in which cheese and other products are sold. Give the disk a frosted appearance by sanding it lightly.



**Stalling or rough idling** may be caused by air sucked in around the gasket between air-horn assembly and float bowl or carburetor body. Tighten hold-down screws periodically, and also check on the nuts that hold the carburetor to manifold.



**For a neater trunk**, stretch a pair of door springs across the inside of the lid, hooking the ends into existing holes. You can then store miscellaneous equipment there—small tools wrapped in cleaning cloths, work gloves and so on. Wire the springs to the lid at intervals to provide compartments for specific items.

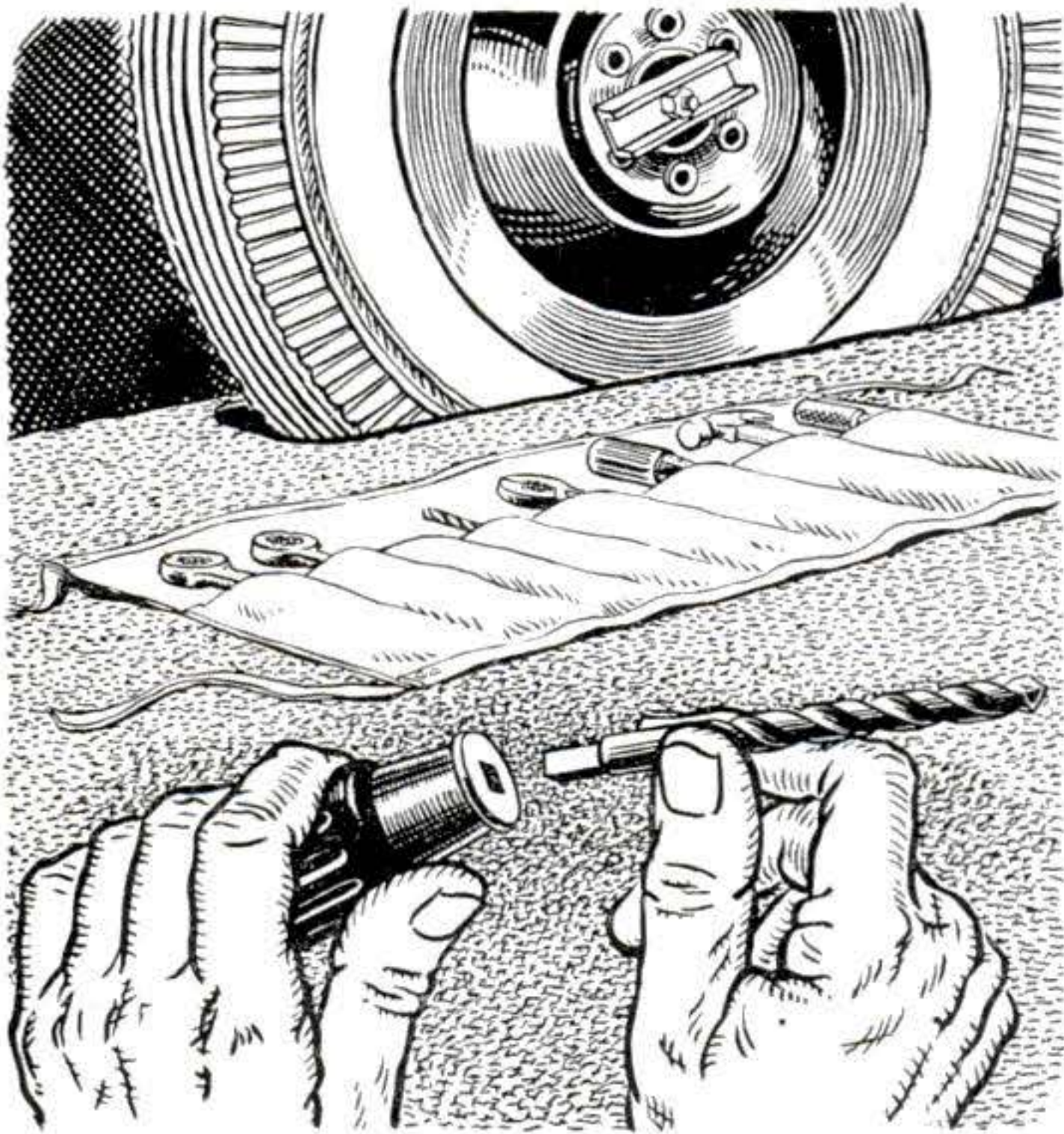


**To stop vibration noise** in a shift rod paralleling the steering column, try this trick. Belting from surplus army equipment is ideal, for it contains reinforced eyes every few inches. Run small bolts through these. Aluminum foil around the rod acts as a lubricant. The rubber allows a certain amount of give.

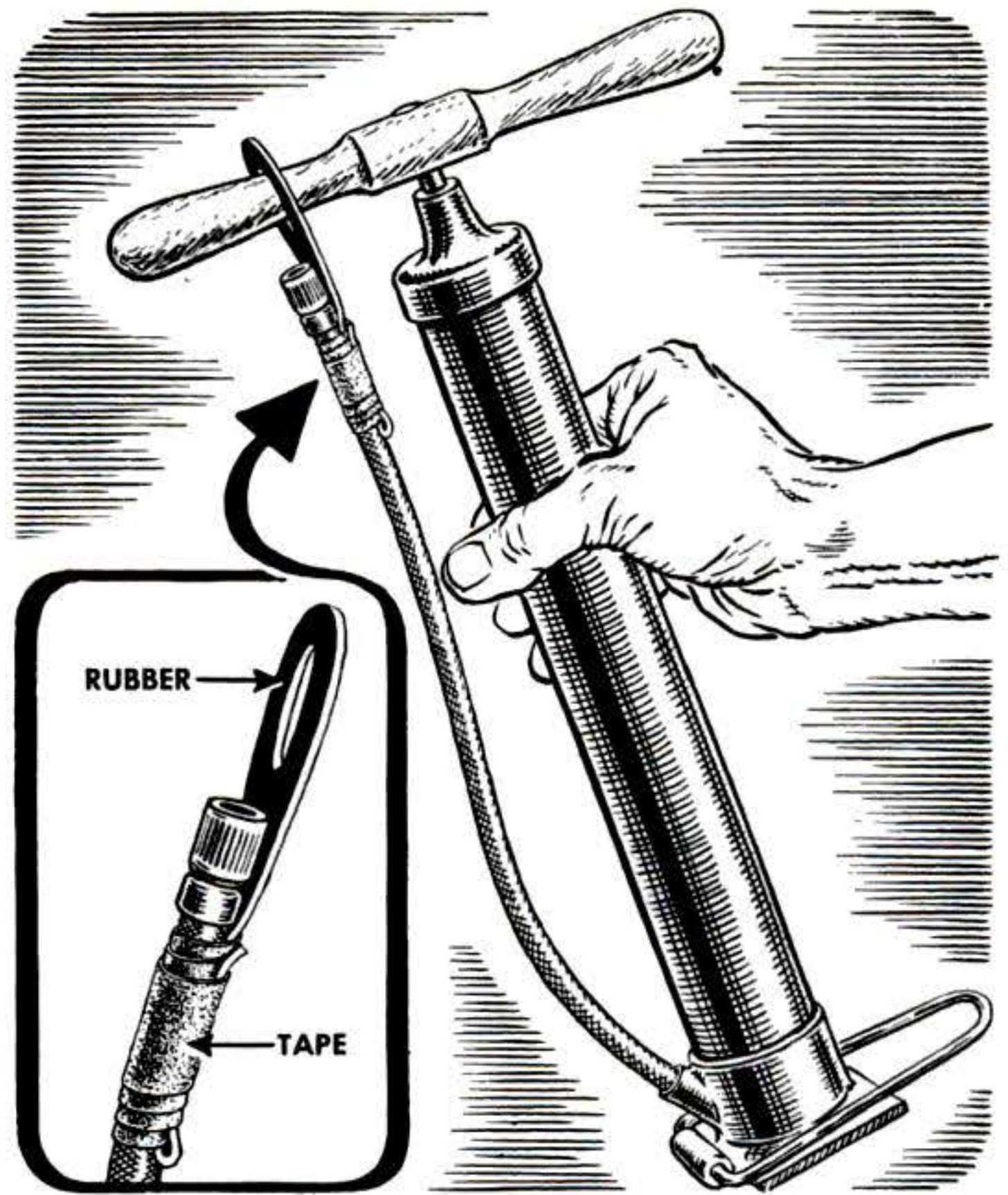
**Please turn the page for more auto hints.**

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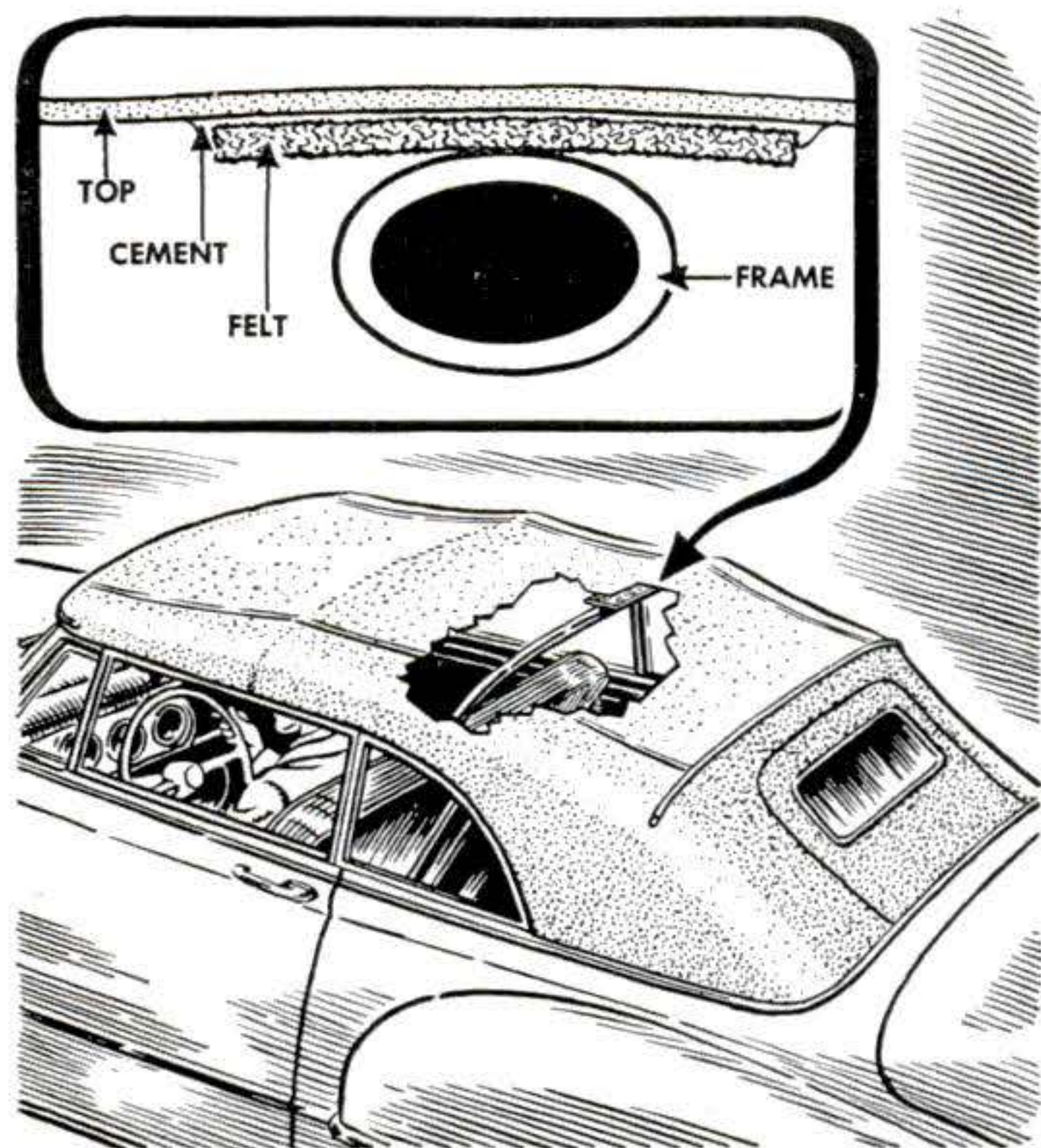
## **MORE** Hints from the Model Garage



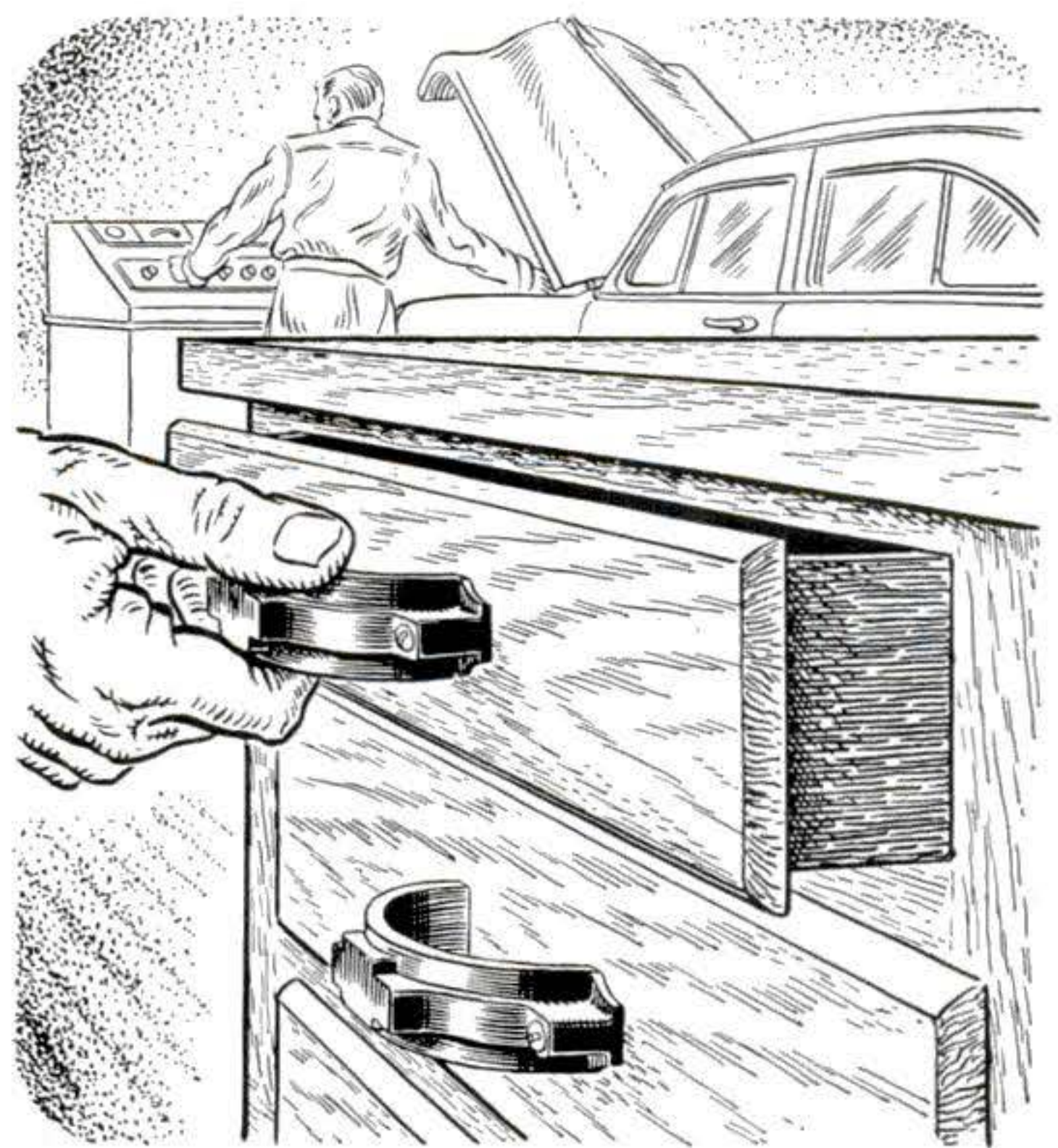
A **twist drill** is a worthwhile addition to a car tool kit if you consider a regular hand drill too bulky to carry. One idea is to grind the drill shank so that it can be used in the handle of a screwdriver that has a set of removable blades.



A **piece of rubber** attached to your tire pump like this will keep it a compact unit while stored with other gear in your car. The projecting rubber bends aside and doesn't interfere when you screw the air hose to the tire valve.



A **convertible top** often wears through at the points where the fabric slaps the frame cross members. A strip of felt or cloth attached under the top above these members will give the fabric longer life. Use rubber cement to attach the strips.



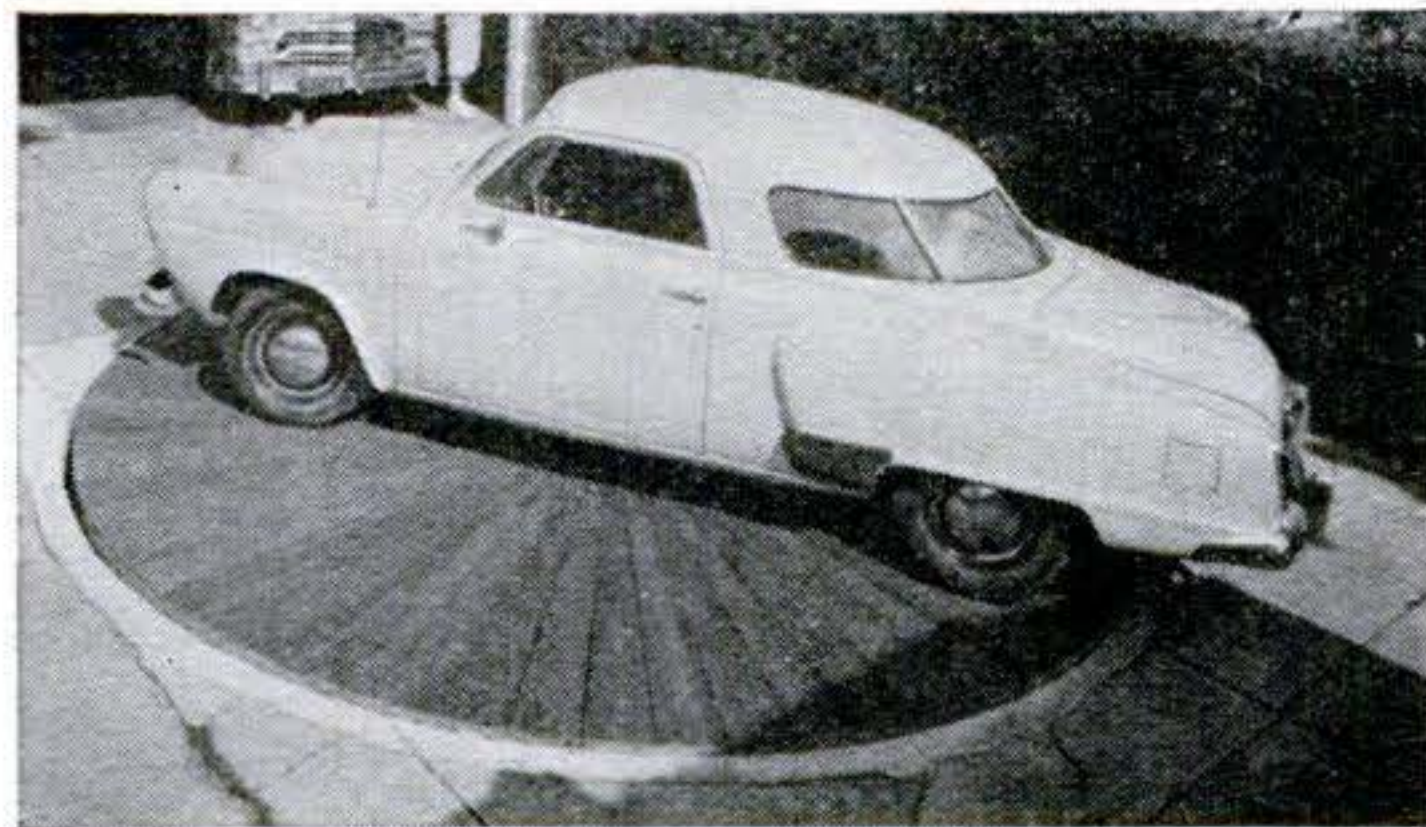
**Discarded caps** from the big ends of connecting rods can be put to use as drawer or cabinet-door pulls in a shop. Bolt or screw them in place. A garage that makes general repairs will usually have a lot of the caps around.

# How a Physician Gets Away Fast

*Scraped fenders are less likely if you can see where you are going.*



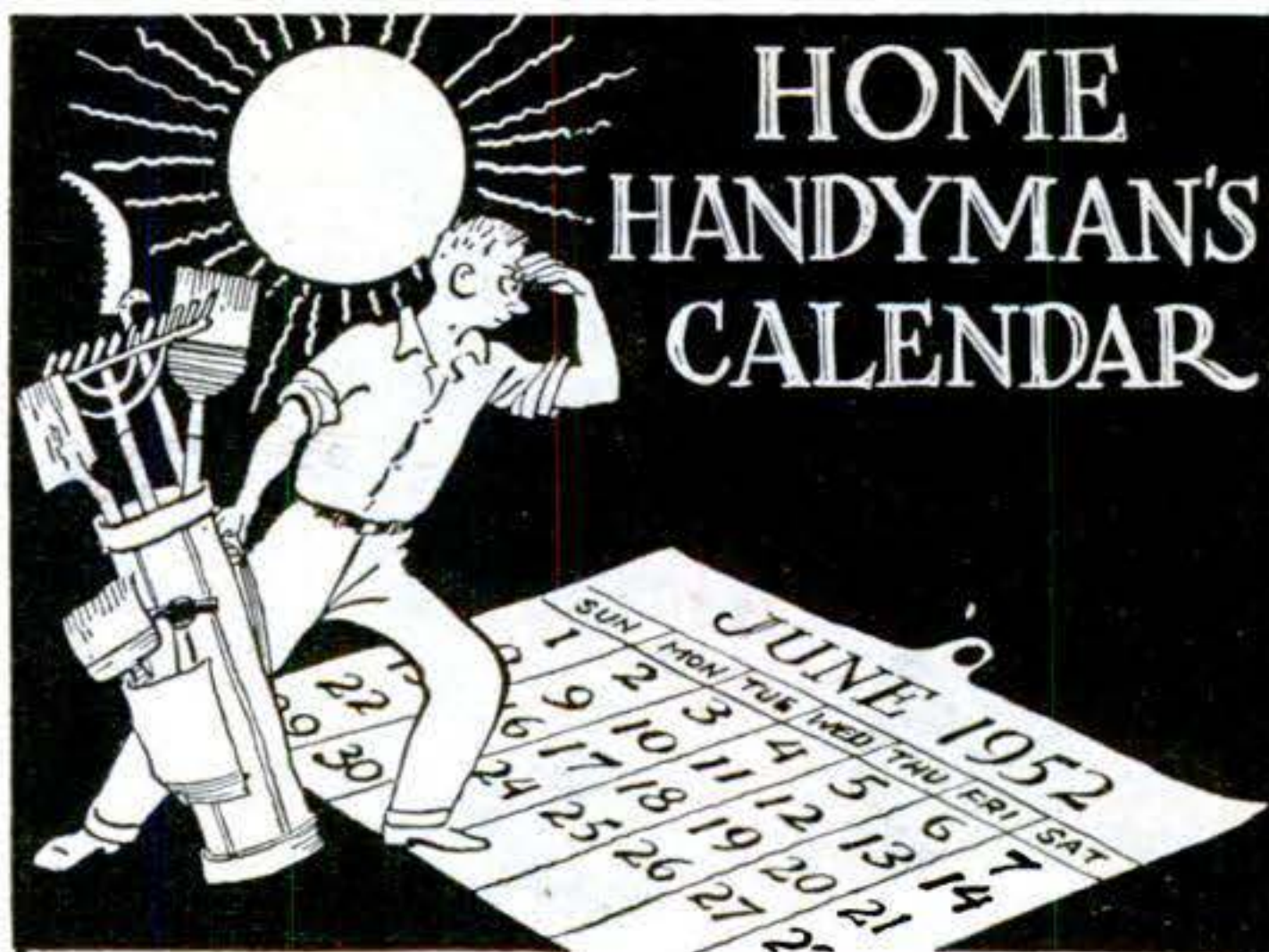
**DRIVING HEADFIRST** through a narrow passage like this saves time and lessens the hazard of scraped fenders. But a Los Angeles doctor had a problem. After he drove through the passage to his garage, he had to back out. There was no room to turn. So . . .



**A TURNTABLE** was installed in the driveway. Now, on returning home, the doctor drives through the passage, parks on the turntable, steps to a switch in the garage, reverses car (in 13 seconds) and backs it into the garage.



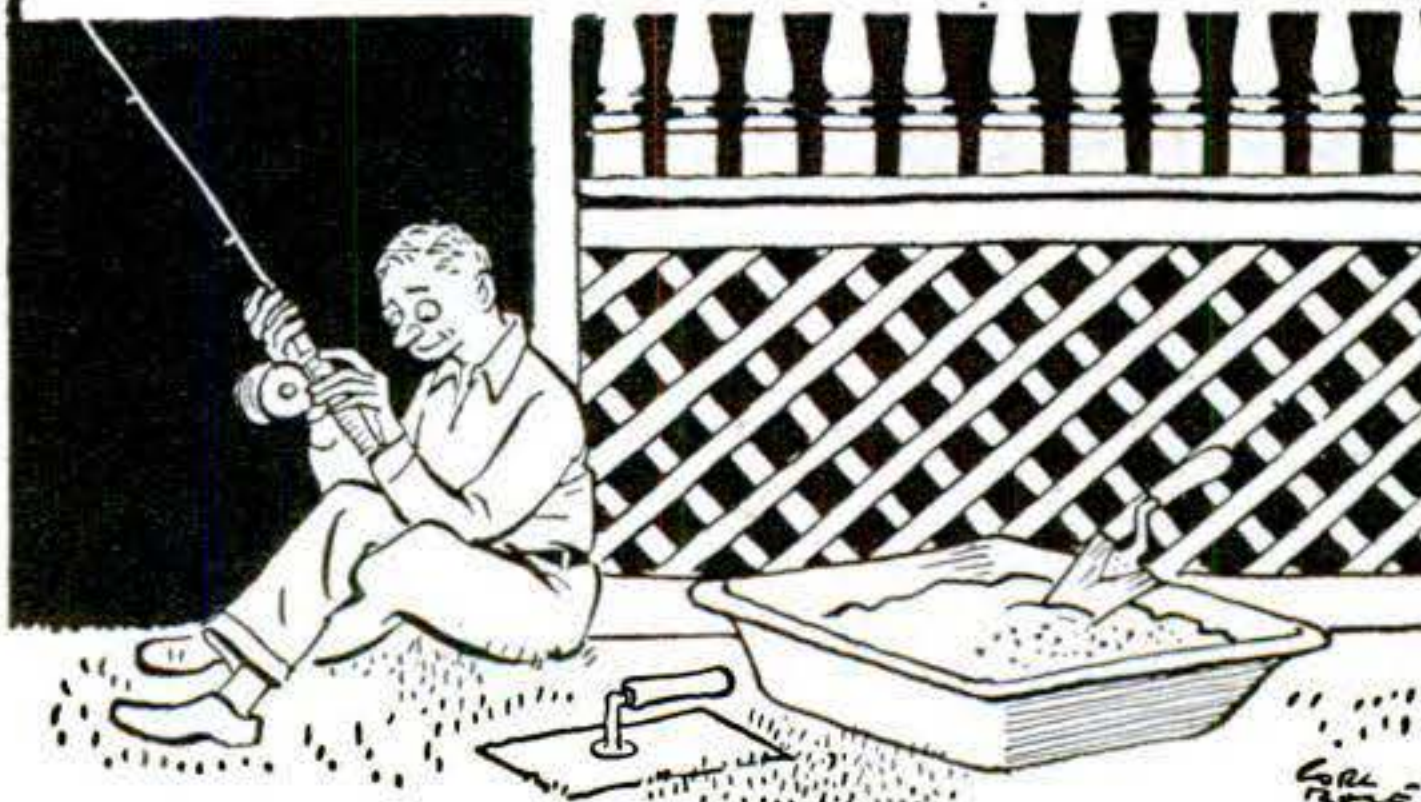
**AWAY HE GOES**, out the passage headfirst, if an emergency call comes. No time-wasting backing. This turntable system, originated by F. N. Eaton, Pasadena, Calif., uses a center bearing and 12 rollers located near the outer edge. A 1/4-hp. electric motor, located in an adjoining pit, drives it through a chain.

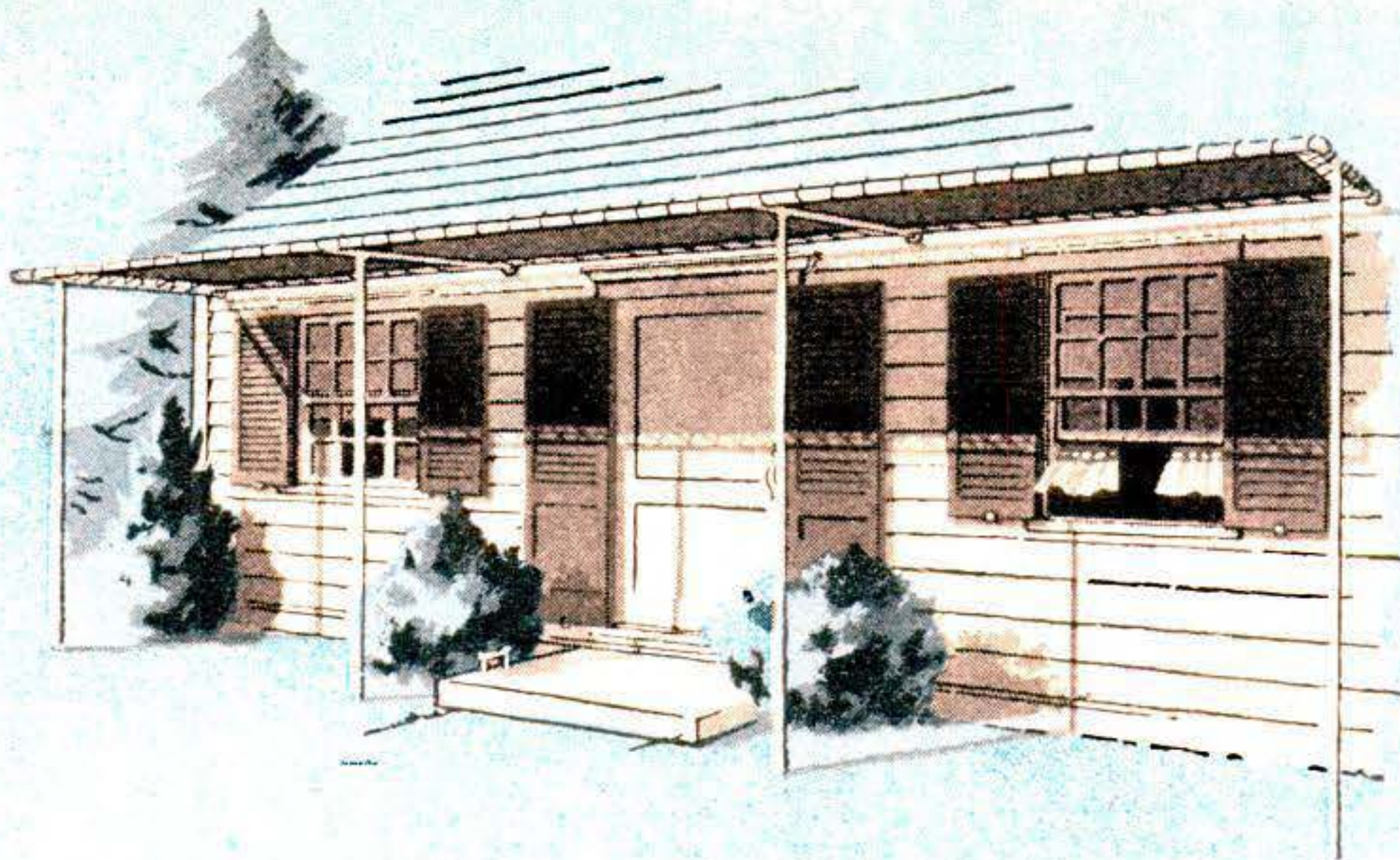


## June

Bringing the longest days of the year, June is the time to finish outdoor chores—before summer heat makes you too lazy.

- Do any necessary outdoor painting now, or else wait until after the first insect hordes have passed.
- Look for signs of rot in supports under porches and outside stairs. Cut out any bad wood and replace it with new.
- Repair garden hose and lawn sprinklers for the watering season ahead. Check outside water outlets for leaks and install an additional outlet if you need one—perhaps on the side of the house where the hose doesn't quite reach now.
- Clean up rubbish, tidy the wood pile, repair the compost enclosure.
- Take advantage of rainy indoor days to keep up lamp and appliance cords, and replace darkened lamp bulbs. Clean all the radiators, using a stiff brush or vacuum cleaner.
- Better check your fishing tackle, for vacation time is on the way. And it's still not too late to start making some piece of needed vacation equipment.

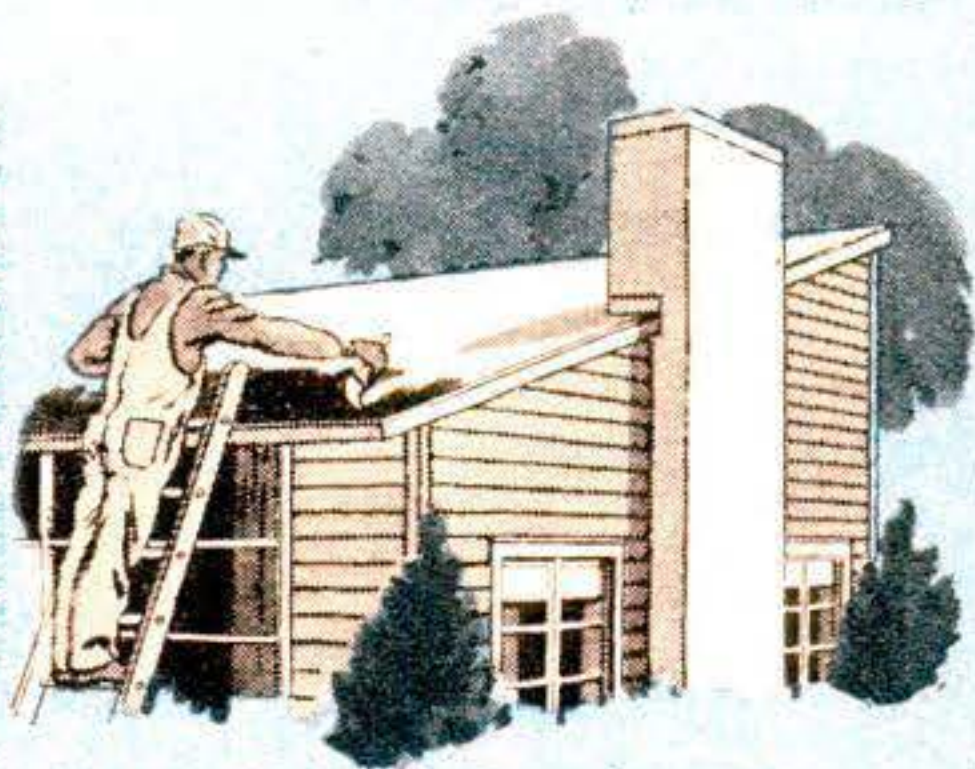




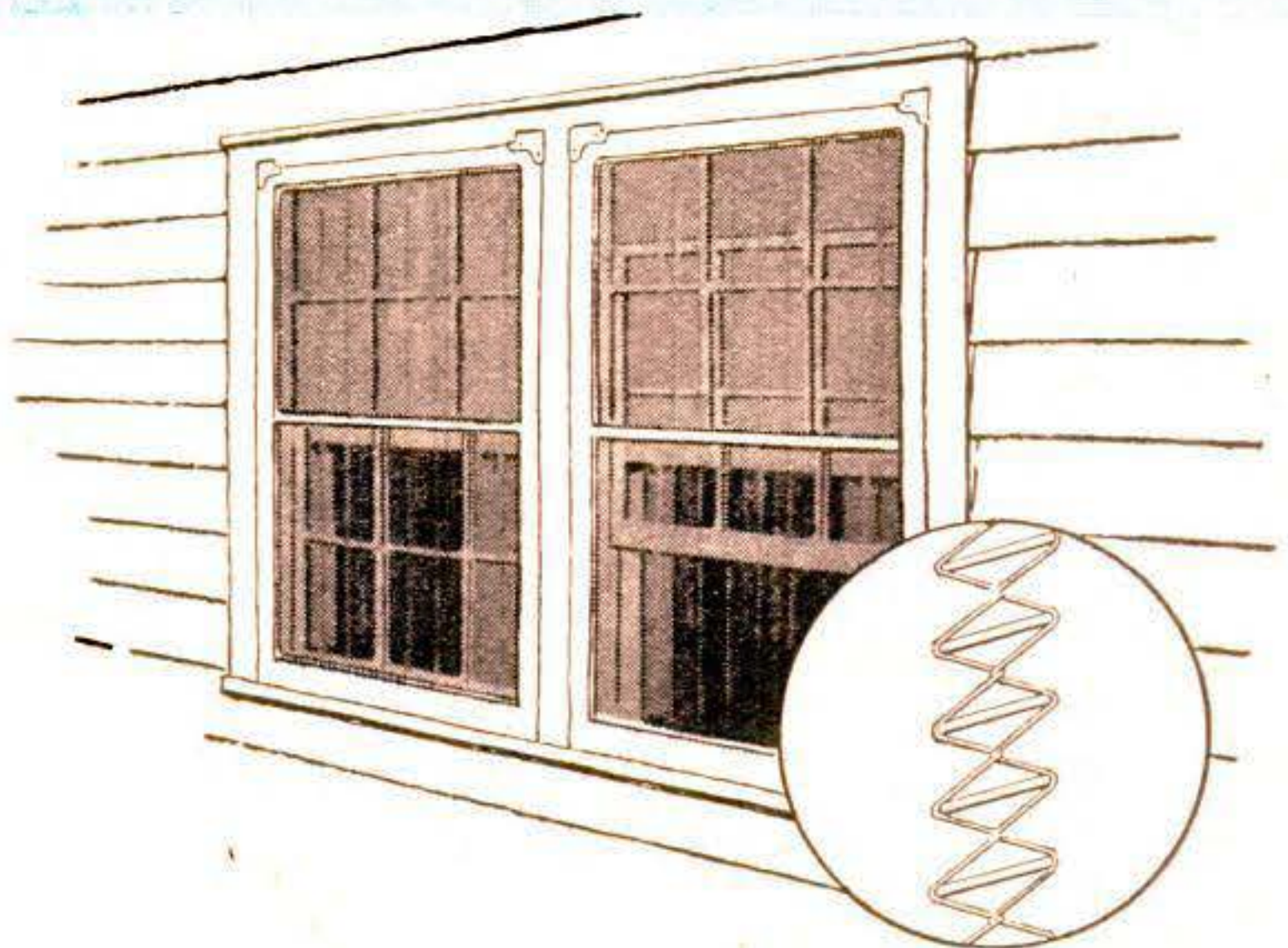
**AWNINGS** don't have to be limited to individual windows—they can be made at home to shield an entire side of a house from the sun. This one has a pipe framework to carry the canvas. For the uprights, 2" pipe will do. The frame can be 1" pipe or even conduit. Plan it so that it is removable after the hot weather is past.

# Why Live in a Hot House?

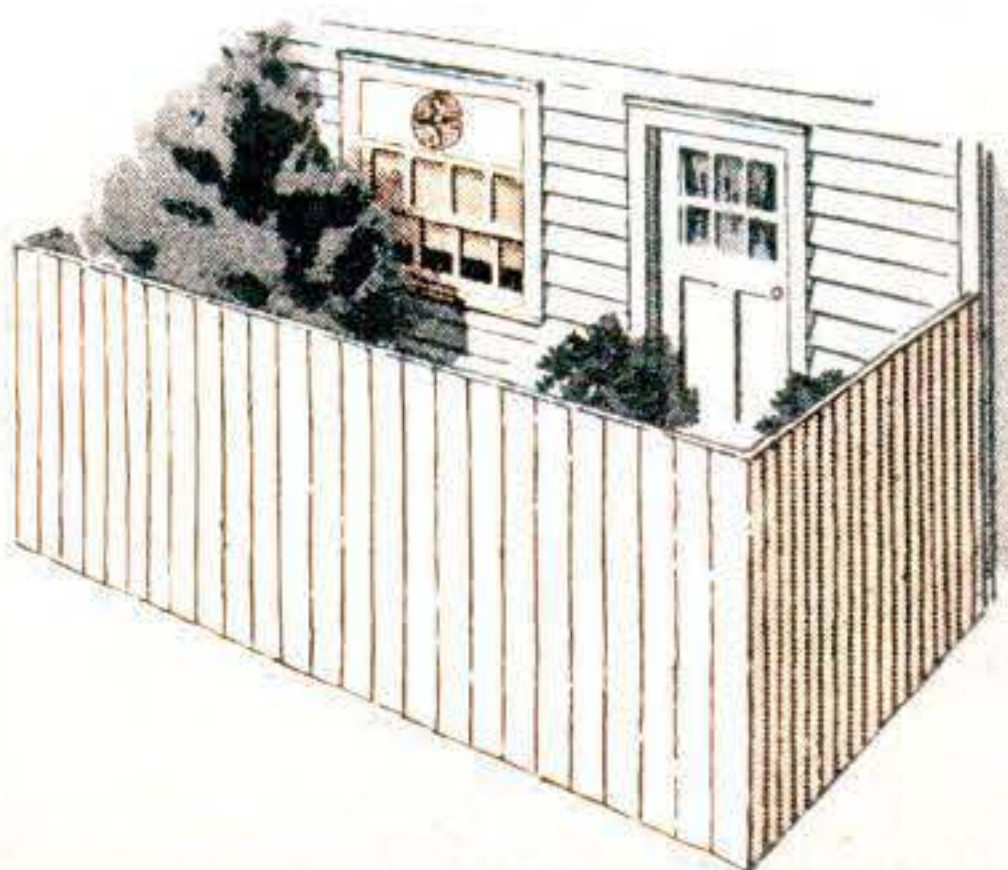
*If you make your own shade and blow your own breezes, you can keep your home a lot cooler this summer.*



**LIGHT COLORS** reflect heat, dark colors absorb it. Painting your roof white will make the attic—and consequently the house—cooler. Use one of the special paints for asphalt shingles. The asphalt won't bleed through these paints as it will through ordinary house paint. For wooden shingles, use a white shingle stain.

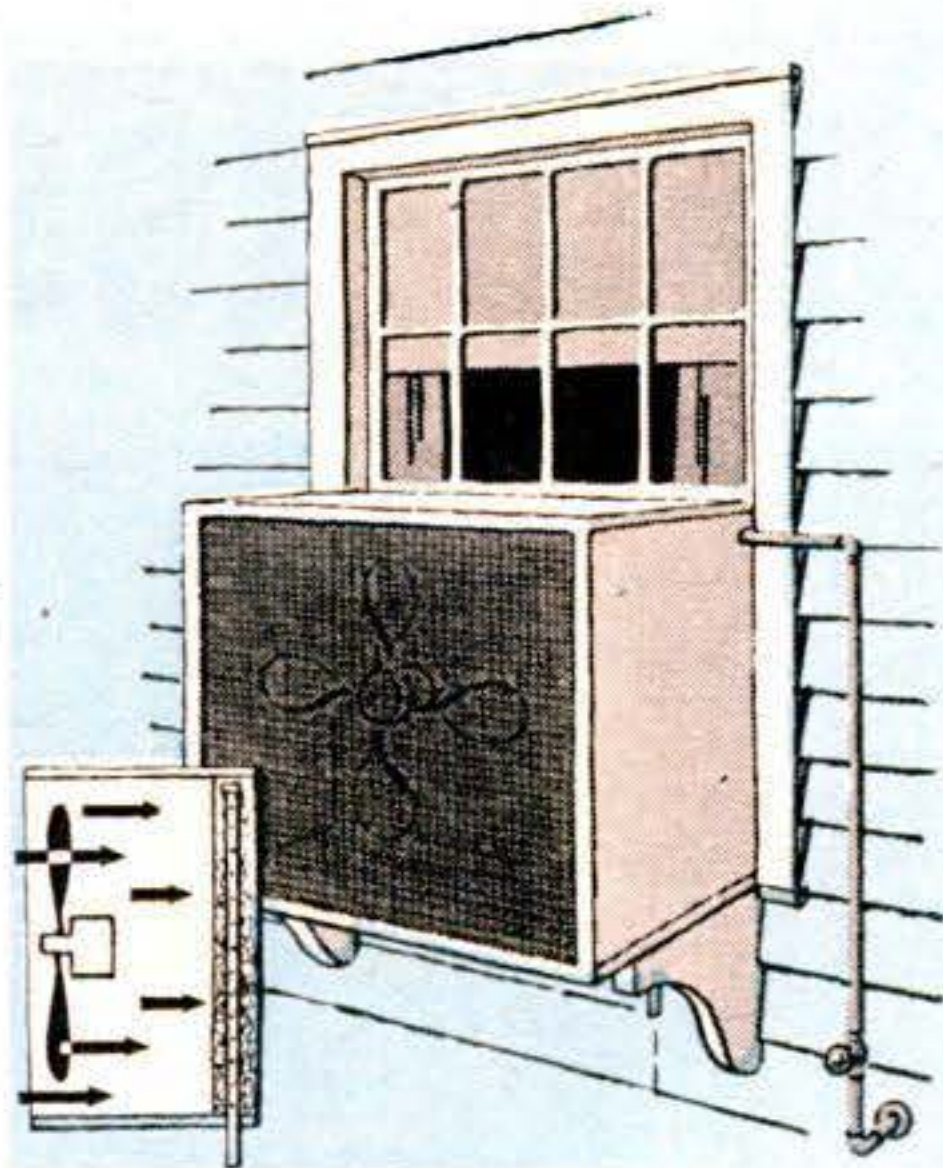


**HEAT-REFLECTING INSECT SCREENS** let in light and air but block the direct rays of the sun. These screens are made up of tiny slanting metal or plastic slats. Vertical wires hold and space the slats.



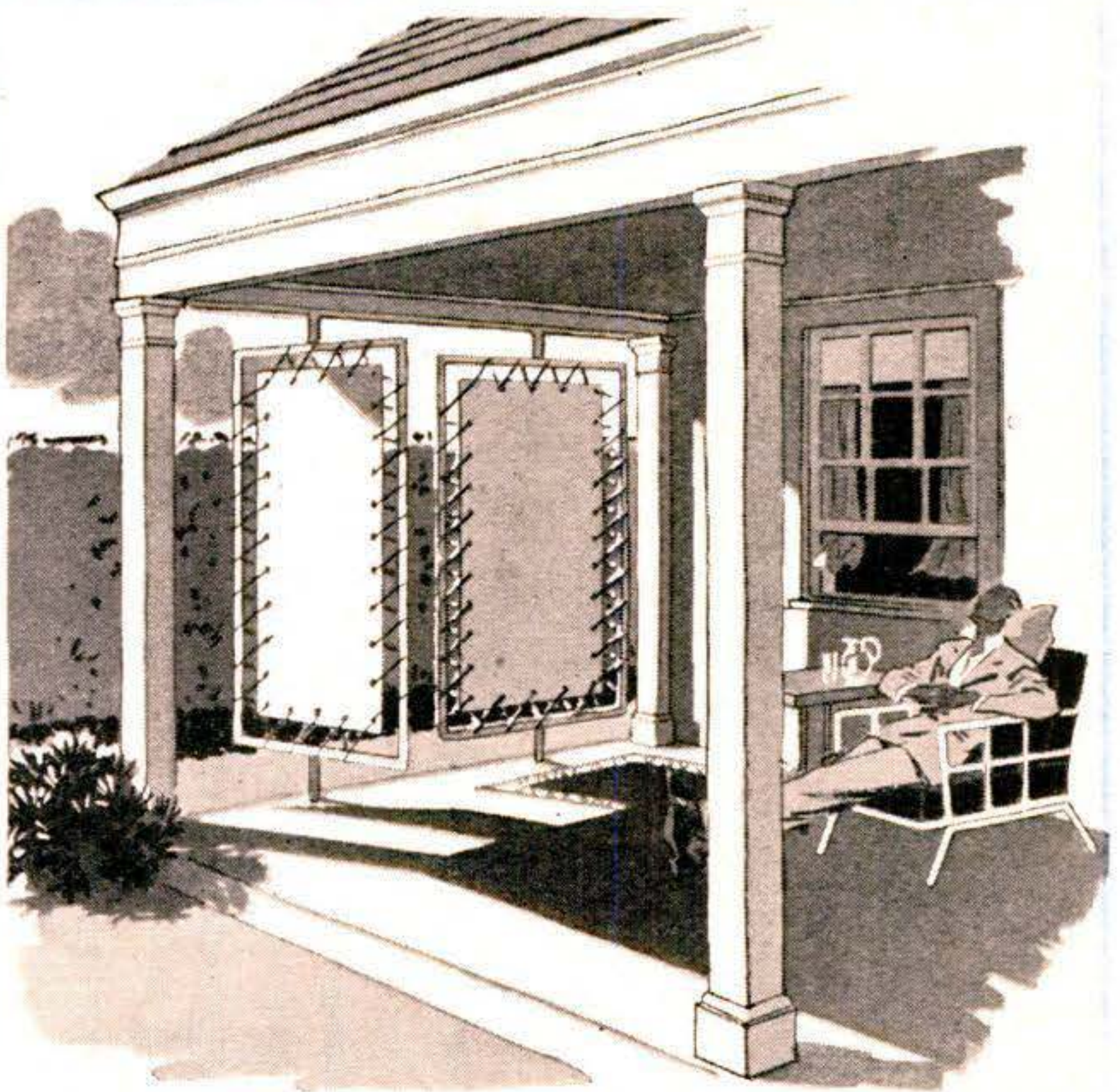
**WINDOW FANS** bring you made-to-order breezes, but they have to be located with care. Don't mount one where it faces prevailing winds that will push against its air stream or where there is an obstruction within five feet. The fan at left is in a poor location because the shrubbery and high fence may cut down its air delivery. Insect screening can reduce a fan's efficiency by as much as 50 percent. It's better not to use a screen or to provide an easily removable one. Window fans are available with expandable flanges to fit many window widths, even casement windows. Most fans blow air out, but some are reversible so that they can also pull it in.





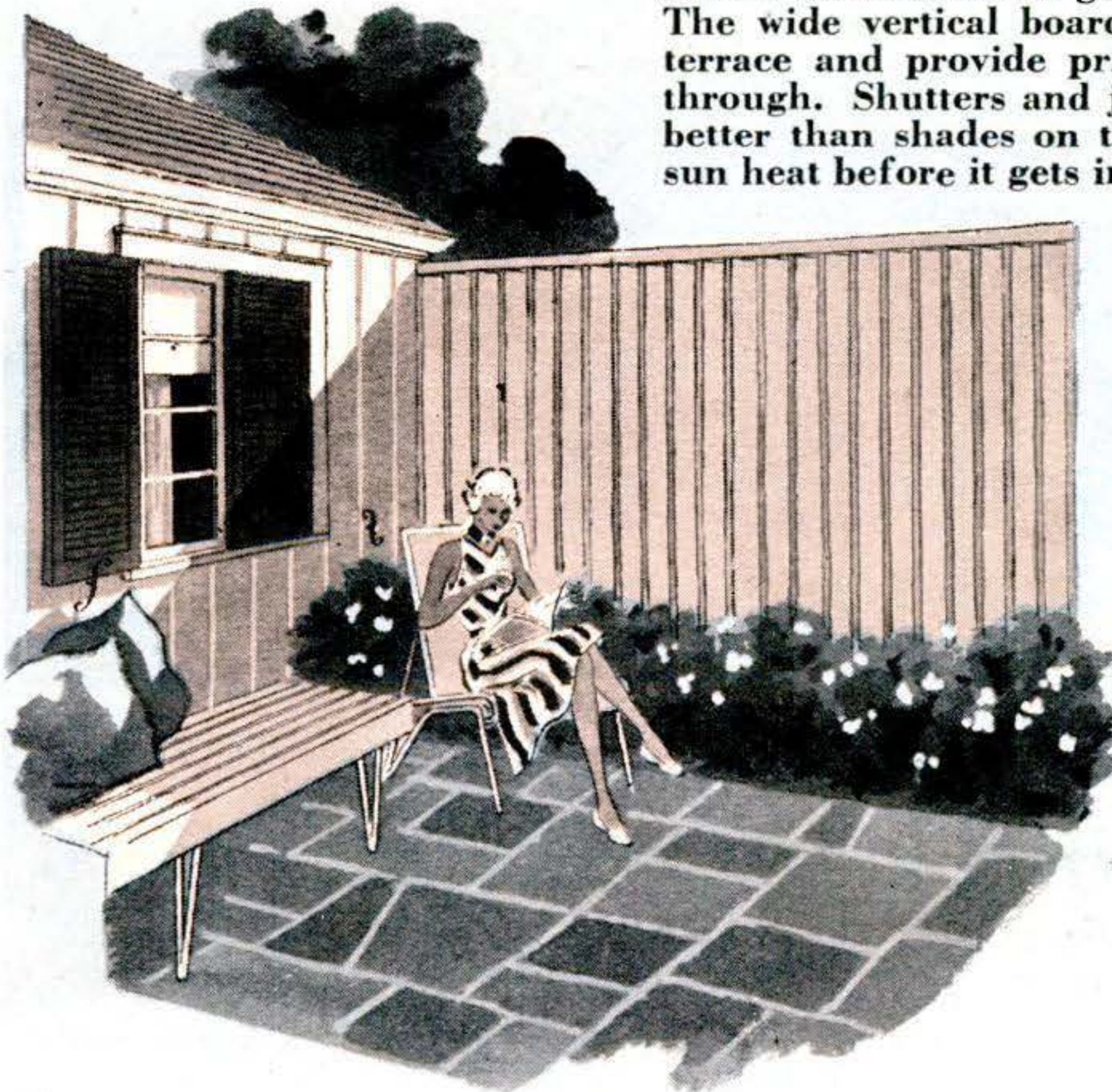
**EVAPORATIVE COOLERS** — also called desert coolers — are mounted outside a window, can be easily built. They work well in areas of low humidity. You need a box, a fan, some excelsior and a water supply. Water drips through the excelsior while the fan blows outside air through it and into house. The air is chilled because it gives up some of its heat to evaporate water from the wet excelsior.

**WATER SPRAYS** on a roof will help cool a house and can cut heat load on air-conditioning equipment by 25 percent.



**SUN SCREENS** pivot to keep out sunlight but let in breeze. They can be bent up from conduit, or assembled from pipe by welding or joining with elbows and tees. Canvas, available in almost any color, is laced into the centers of the pipe frames. A remote-adjustment mechanism, like the awning control shown on the following four pages, would add a luxury touch.

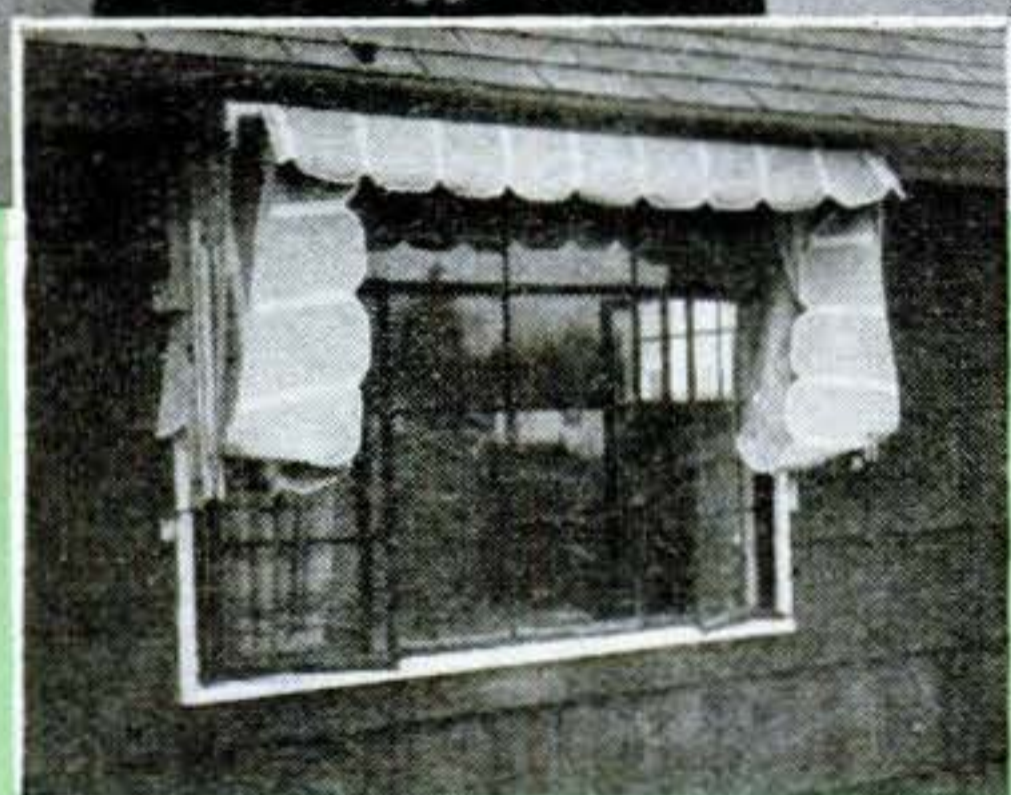
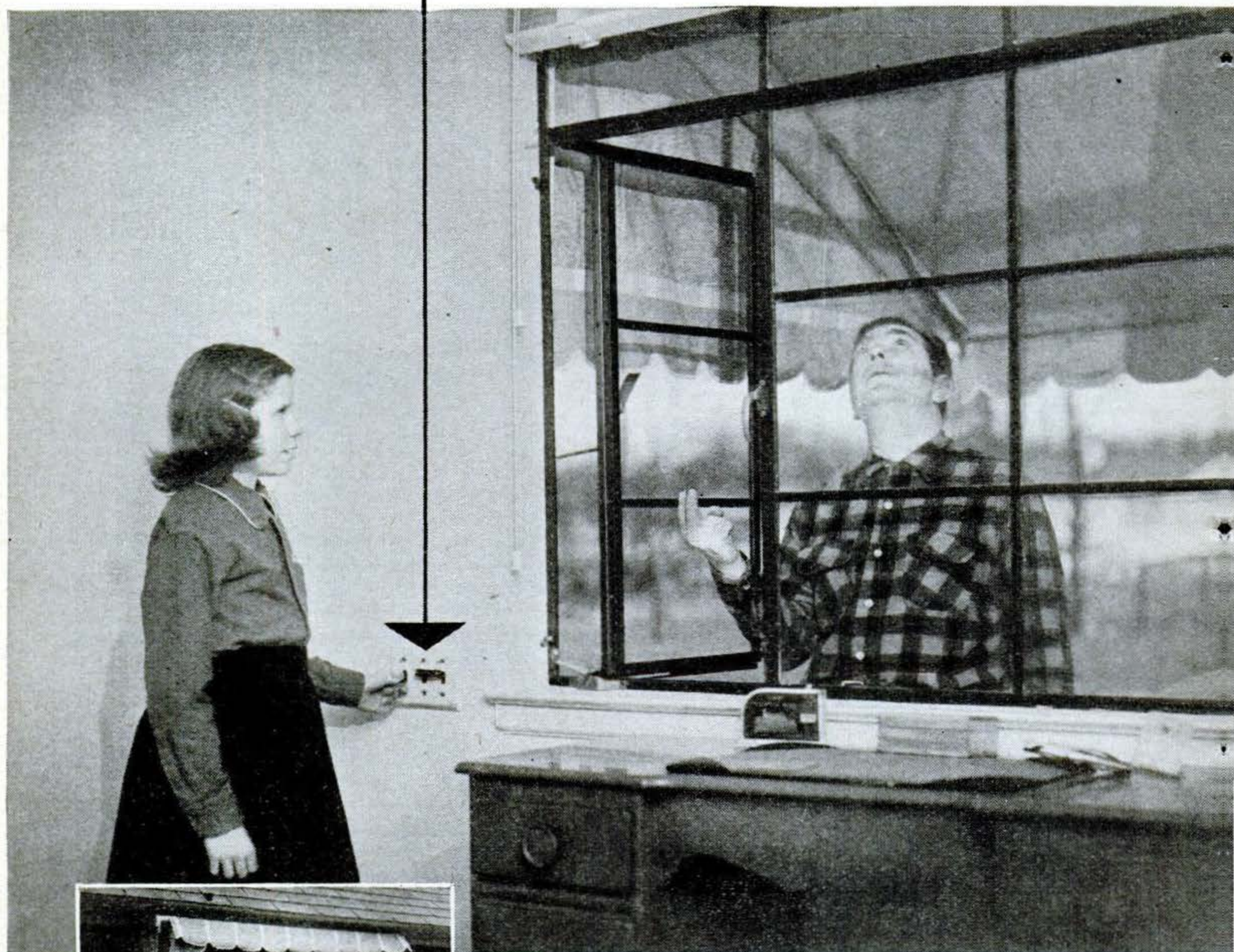
**SHUTTERS AND JALOUSIES** help beat the heat. The fence at left below is like a giant jalousie turned on its side. The wide vertical boards, set at an angle, shade the terrace and provide privacy yet let the breeze blow through. Shutters and jalousies outside a window are better than shades on the inside, since they stop the sun heat before it gets inside the house.



**FLOOR FANS** look like hassocks or cocktail tables. They pick up air at floor level—where it is coolest—and move it upwards and outwards.

**FANS ARE RATED** by the number of cubic feet of air per minute they deliver. To find the size window fan you need if you live in the North, divide the cubic feet of the room by three. Divide by two for the central states. For the South, use a fan that handles as many cubic feet as the room has.

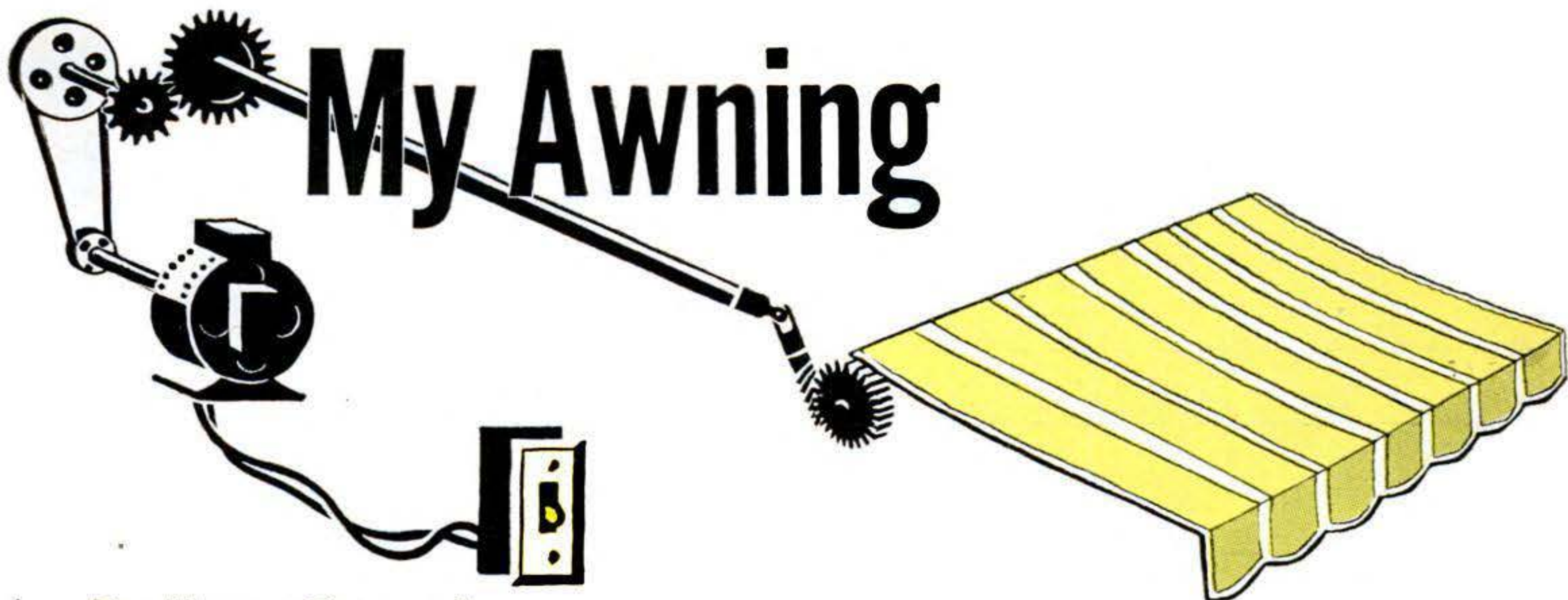
# This Switch Operates



**A child can raise or lower the awning with one finger. The muscle comes from a motor in the attic, through homemade drive and foolproof controls.**



**HOOK WAS REMOVED** from crank-up awning gear, leaving a  $\frac{5}{8}$ " shaft. This is geared to the awning roller in an 8-to-1 ratio. Mounting bracket was screwed to board enclosing eaves.



# My Awning

By Harry Samuels

"YOU know what Jackie's room is like in July and August," said my wife. "With that southern exposure, the sun wakes her up too early, and by midmorning the room is an oven. We need an awning."

"But not another chore," I said. "So let's have it motorized."

"Just so it's an awning."

"With push-button control to raise or lower it from inside the house. After all, this is a push-button age. And button pushing," I finished firmly, "is all the extra chore I'll take on for a long, warm summer."

Armed with my dreams, I went awning shopping. The nearest thing to what I wanted was a roller awning with a right-angle gearbox at one end. A shaft coming out of it had a hook. Most people, the man said, turned this with a hand crank that slipped over it. The folding arms looked like lazy tongs. They were necessary to clear my casement windows, which extended 18"

from the wall when they were wide open.

With this rig mounted on the house, we had an awning. After a little work I arranged it so the control shaft stuck up into the attic. My wife and children insisted this was inconvenient.

"Okay, okay," I said, and hastily started planning a motor drive.

**Gearing it down.** Though tempted by 24-volt surplus motors with built-in reduction gears (which would have tangled me up in rectifier circuits), I settled for a ¼-hp., 115-volt split-phase motor. Since the awning was to move slowly, this could be geared down so much that starting under load would be easy. My next problem was how to do this.

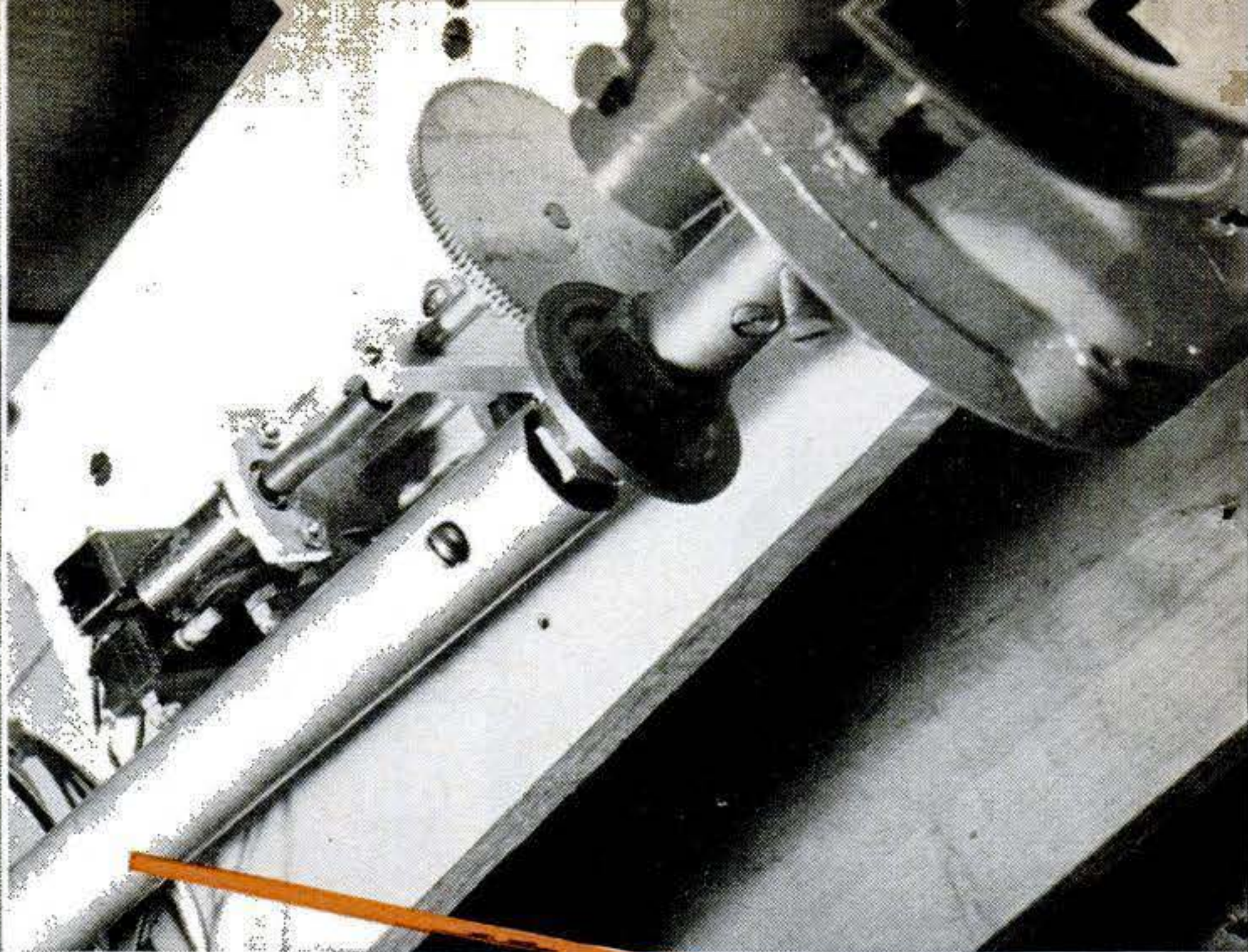
The awning gear gave a step-down ratio of only 8 to 1, so a lot more reduction was needed. I found it on a hardware counter in the shape of a hand-cranked grinding wheel. Counting wheel revolutions to one



**SHAFT HOLE WAS SPOTTED** by sighting along mounting bracket and gear-case collar. An extension shaft of light aluminum tubing was bolted on and pushed through into the attic.



**TWO BOLTS** were tightened to clamp the gear case into its bracket. The other roller mount is a hinged bearing. Awning falls into place of its own weight as it is unwound.



**UNIVERSAL JOINT** in attic links shaft to a longer drive shaft made from a TV antenna mast. Top end is bushed to fit arbor on grinder used as reduction unit.

**SMALL ARBOR**, made to hold buffing or grinding wheels, is clamped by a setscrew to stub shaft of grinder on which crank was mounted. Small gear on arbor drives larger one on limit-switch mechanism.

turn of the crank proved the gears inside had an 11-to-1 ratio.

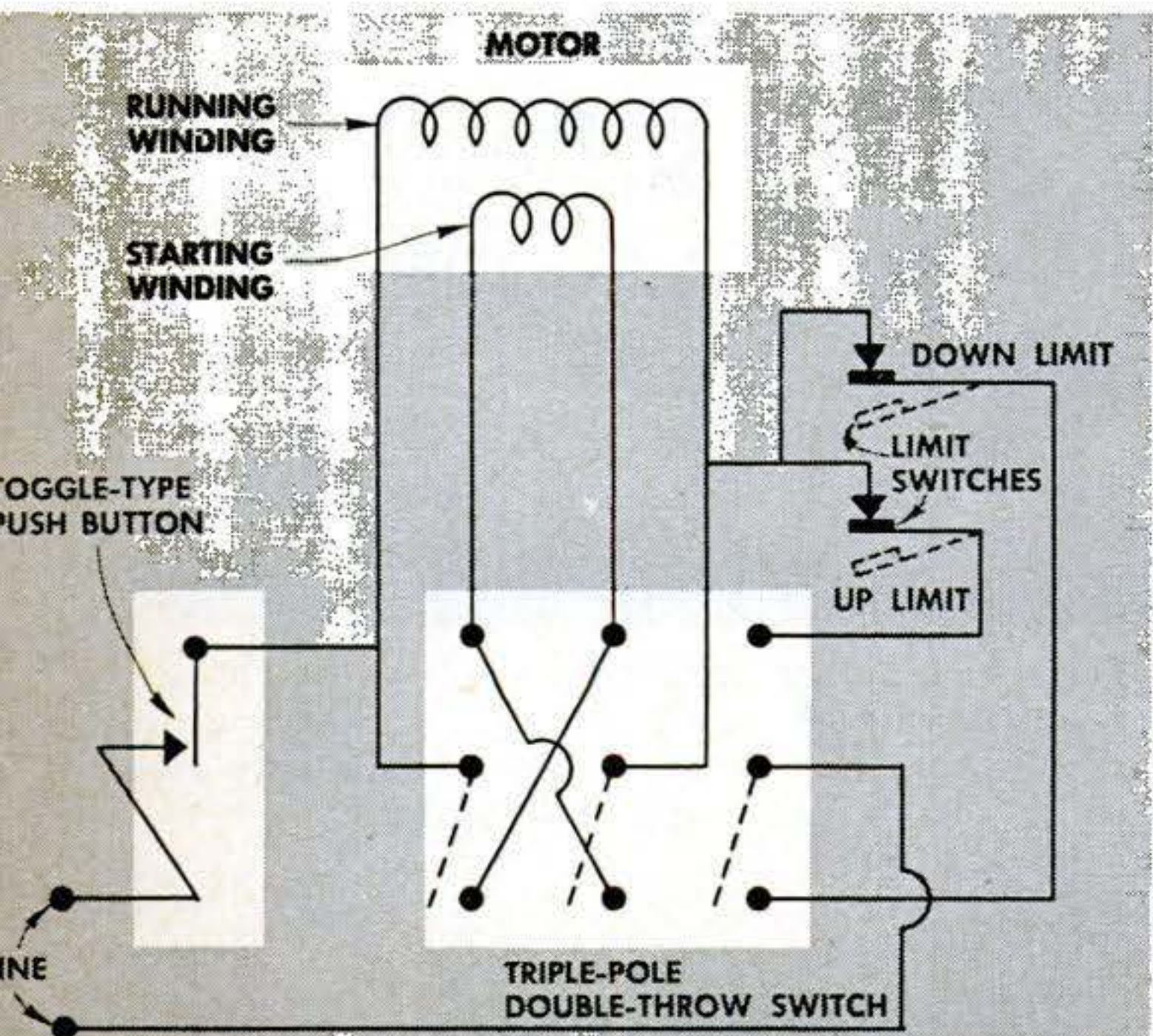
This grinder, with wheel and crank removed, was mounted on a rafter by its own clamp, and the awning drive shaft, angled through a universal joint, was coupled to what had been the hand-crank shaft. A 5" pulley was mounted in place of the grinding wheel. A 2" pulley on the 1,750-r.p.m. motor gave a reduction of 2 to 5. Therefore the grinder shaft turns at 700 r.p.m., its output shaft at about 63 r.p.m., and the awning roller at just under 8 r.p.m. Full awning travel actually takes about 50 seconds.

**Up, down or part way.** Sometimes half an awning is better than all or none, so I wanted to be able to start, stop or reverse the roller at any point. And because awnings cost money, I wanted the motor to stop automatically at each end of its travel before the cloth ripped.

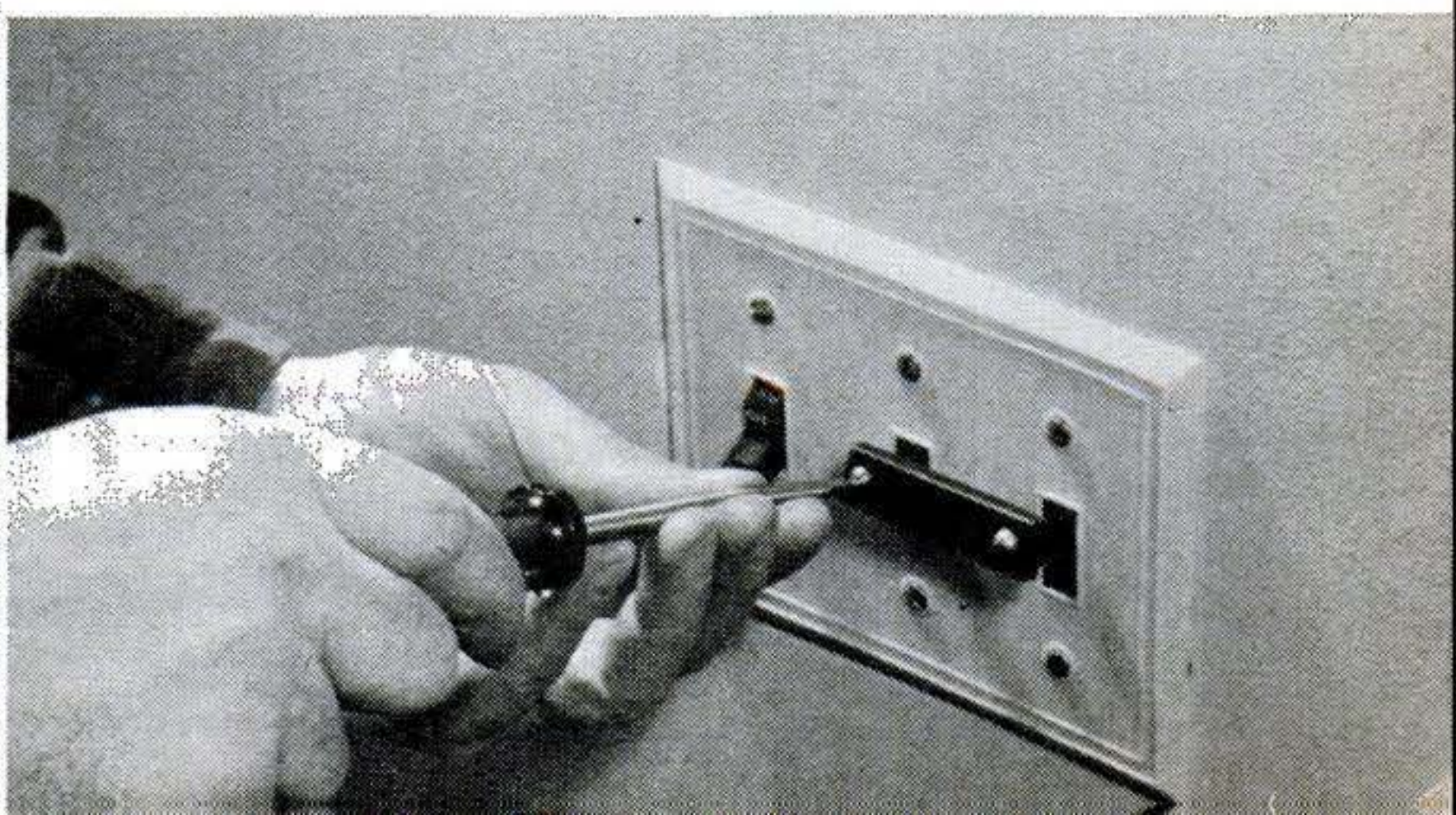
A switch that cut off the juice when the awning was all the way up or down wasn't the whole answer. There had to be juice to operate it the opposite way. The limit control consists of two midget snap switches mounted on a tiny war-surplus worm-gear unit which in turn is geared to the drive shaft. One switch is mounted plunger up, the other plunger down, so that the two cams on the slow output shaft trip either one or the other, depending on the way the unit runs.

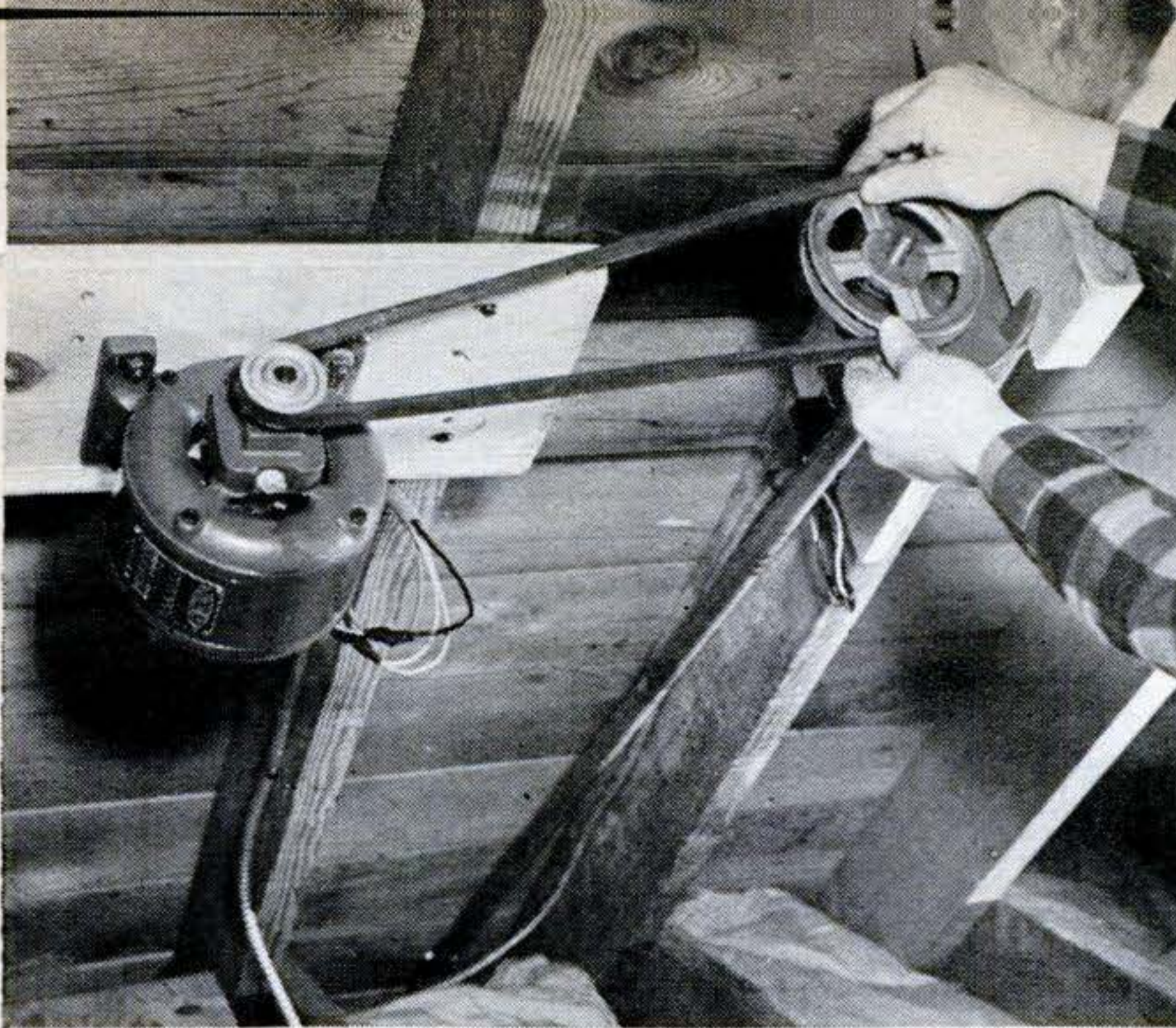
The awning was run up and the cam adjusted so that it just tripped the up limit switch. Then the same setting was made on the other switch with the awning all the way down.

**Switches in the wall.** All wiring was done with 115-volt cable, boxes and switches. A momentary-contact toggle switch, which has the same action as a push button, feeds

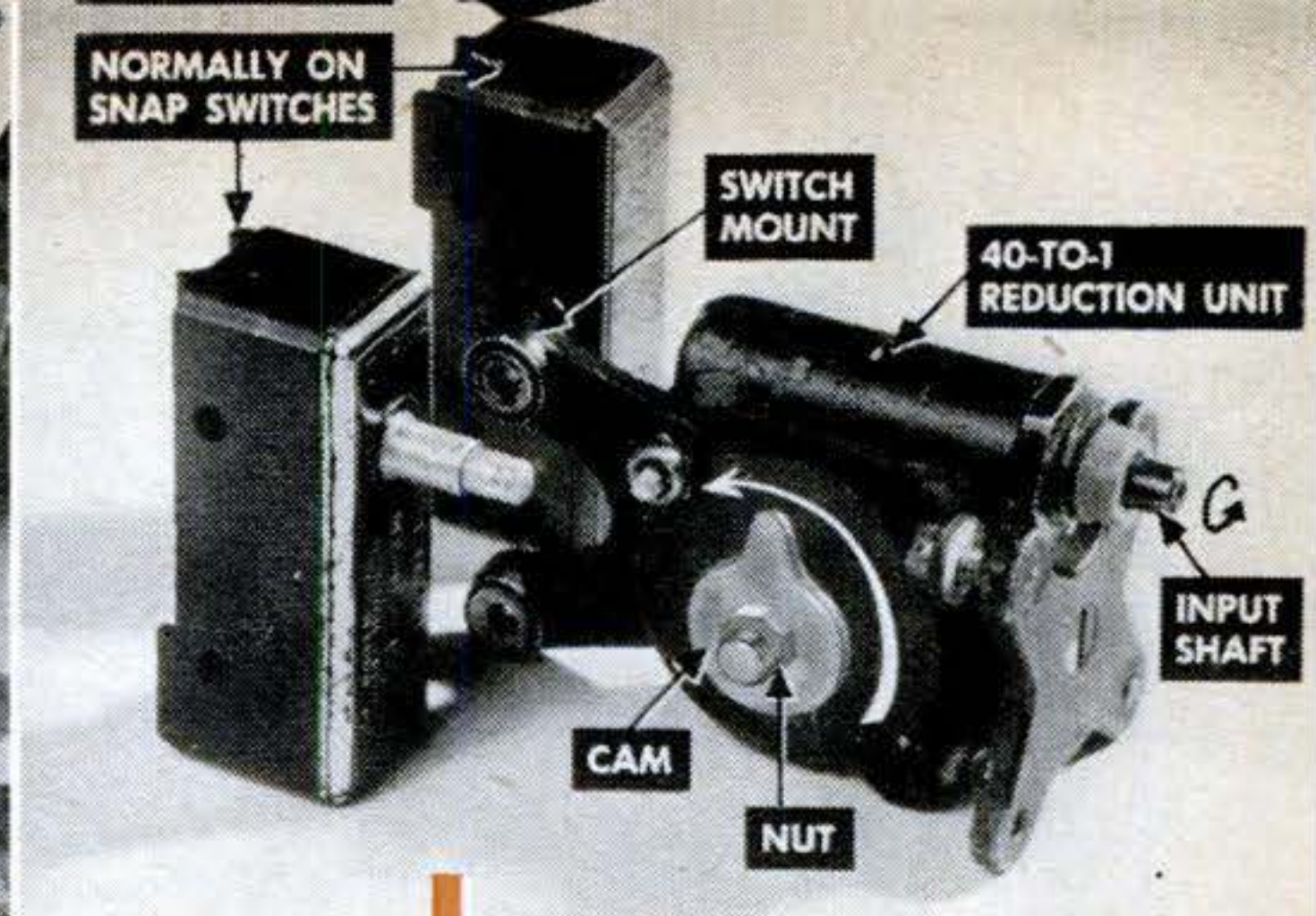


**GANGED SWITCHES** are thrown to run awning in the desired direction. Then spring toggle switch at left is held to turn on the power. Foolproof circuit prevents overtravel. Eight wires run through extra-large armor from attic to wall switches in room below.

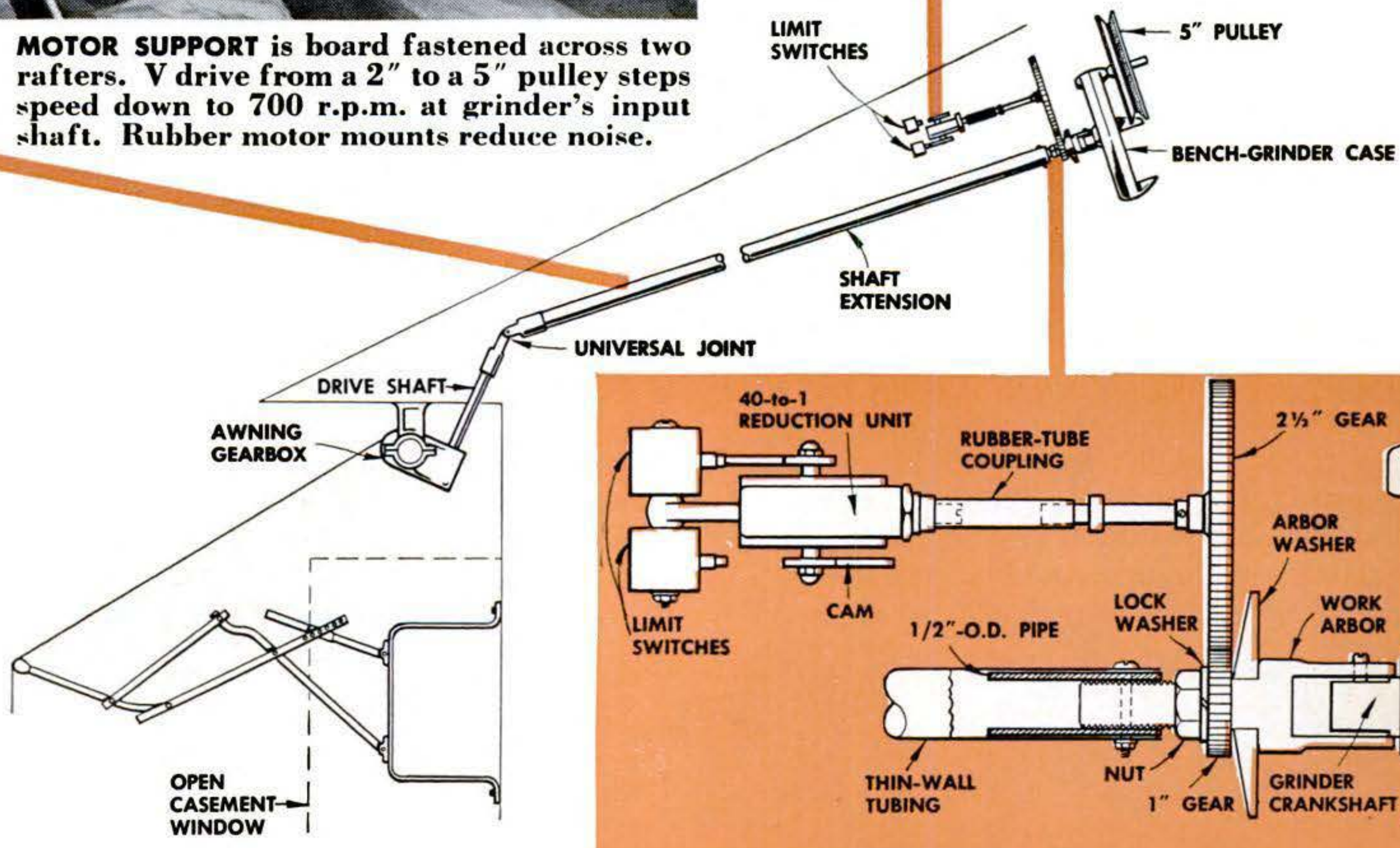




**MOTOR SUPPORT** is board fastened across two rafters. V drive from a 2" to a 5" pulley steps speed down to 700 r.p.m. at grinder's input shaft. Rubber motor mounts reduce noise.



**TINY WORM-GEAR UNIT** has 40-to-1 ratio, a cam on each end of slow shaft, and lugs for mounting limit switches. Rotation one way trips one, opposite rotation the other. Cams are set with awning full up and full down.



juice to the whole circuit only when it's held in the on position.

What reverses the motor is in effect our old friend the double-pole, double-throw switch, but what I asked for at the store was a four-way switch. This has a built-in crossover connection, so you hook wires to only four terminals instead of six. A single-pole, double-throw switch routes current to the proper limit switch. Professional juice slingers call this kind a three-way toggle switch.

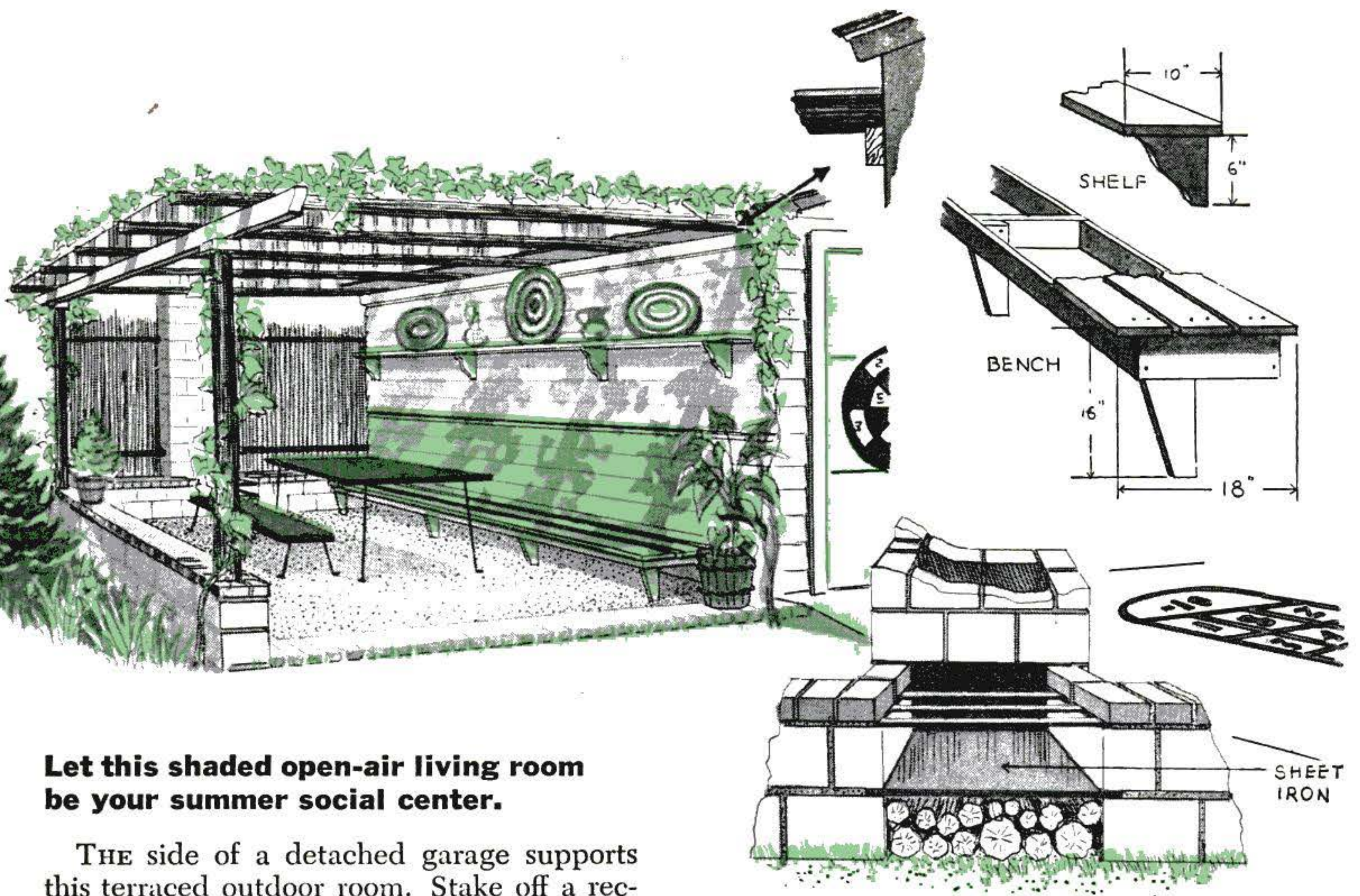
You can't tell which terminals are which by looking at these switches, and the wiring diagrams on the boxes aren't much help. I rigged a series test lamp by cutting apart one wire of an extension lamp cord and using the two cut ends as test prods.

By holding these on two switch screws, I could tell whether current would flow through in either toggle position. Guided by this, I hooked up the switches to do what the diagram called for.

The three-way and four-way switches are ganged to operate as one, making in effect a triple-pole, double-throw switch. (This would be hard to find no matter what you called it.) Ganging was done by drilling and tapping both toggle bars and mounting a plastic crossbar with two machine screws. The control is foolproof; juice reaches the motor only if you throw the reversing switch the way the awning can go.

It worked the first time. The wife and kiddies were properly amazed. I didn't admit it, but so was I.

END

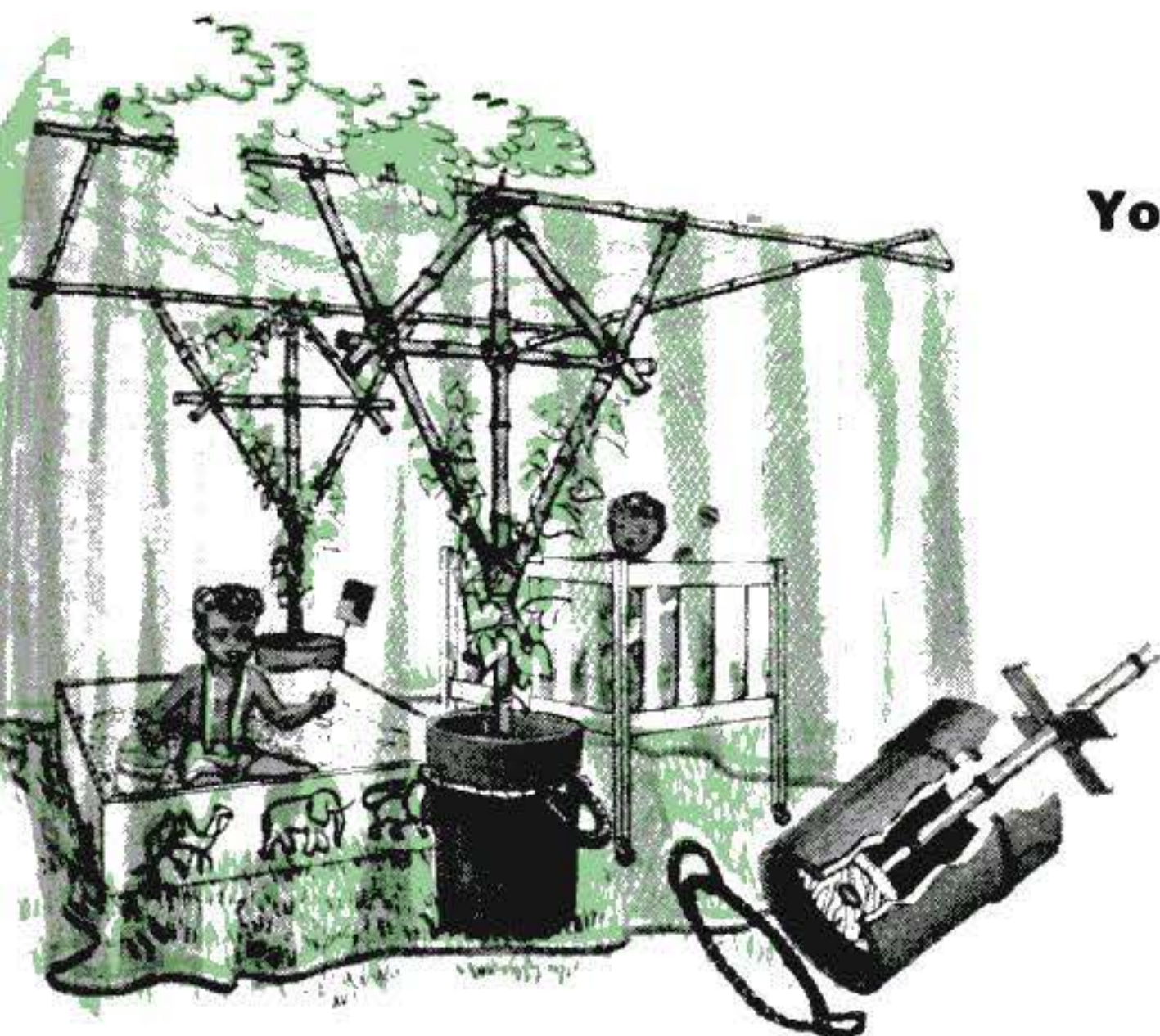


**Let this shaded open-air living room be your summer social center.**

THE side of a detached garage supports this terraced outdoor room. Stake off a rectangle, lay two or three courses of cinder block along two sides and a row of bricks in front. Fill the floor with 2" of washed gravel. Lay a brick cap over the cinder blocks and mortar 6" cedar posts into the cap. Roof the arbor with 3" cedar logs and a cover of reinforced plastic sheet. Use

split-hickory fencing for privacy if needed. Furnish the arbor with a shelf, bench, potted plants. Add ground improvements such as an outdoor grill, garage-door dart board and shuffleboard court to make the terrace an all-summer gathering place.

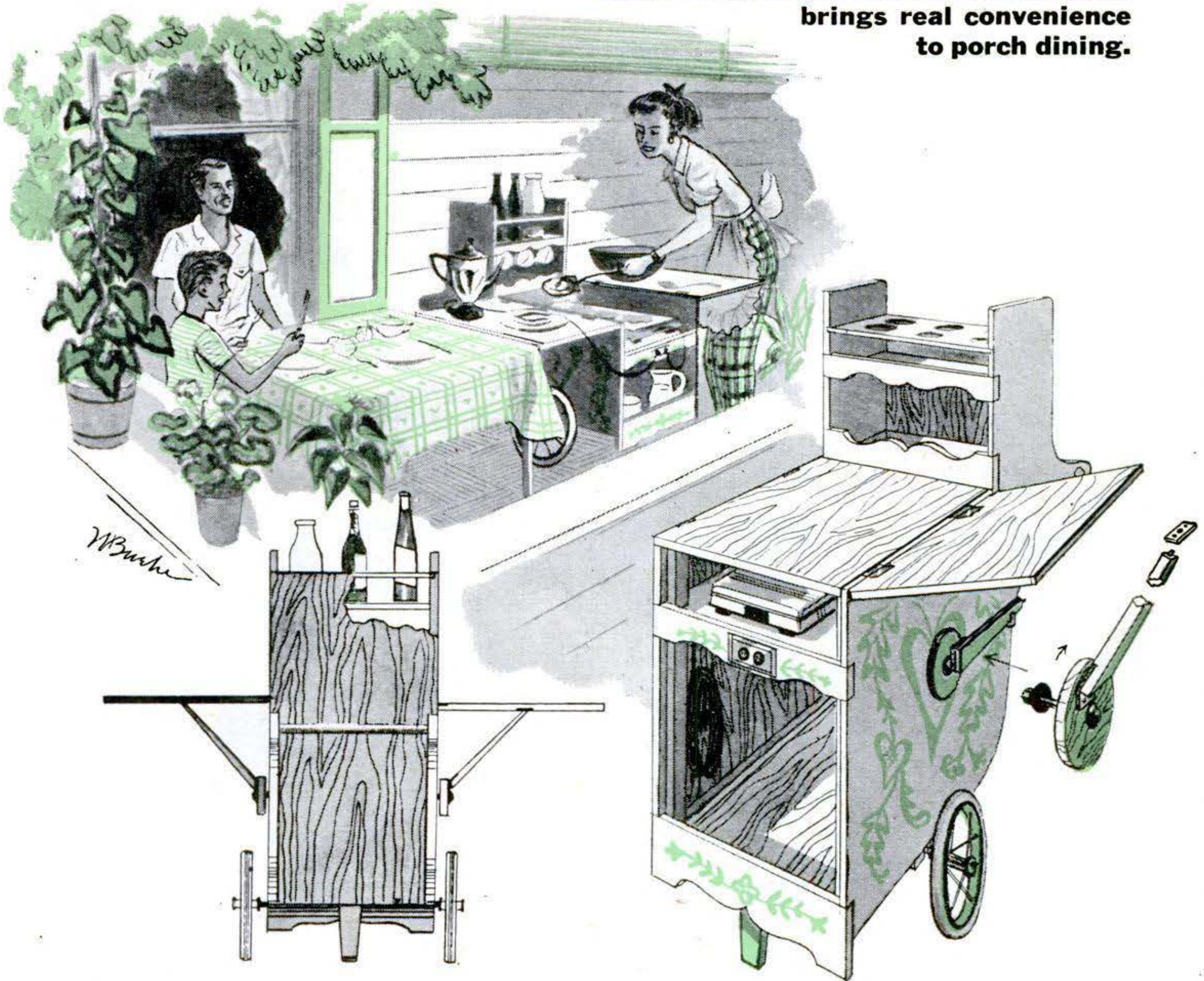
**Your family will not mind the hot weather if you furnish your lawn or porch the way you would a living room.**



**You can move this screened play yard to follow the sun, shade or breeze.**

KEEPING insects away from children—or from your own lawn chair—may be worth much more than the effort it takes to build this portable porch. Wedge 7' bamboo poles into two sections of drain tile as shown and fill the crocks with earth. Tie diagonal braces to the upper part of the poles and use them to support horizontal "rafters." Drape light mosquito netting over the rafters. Loop rope around the tiles to make convenient carrying handles.

**This serving wagon and portable kitchen brings real convenience to porch dining.**

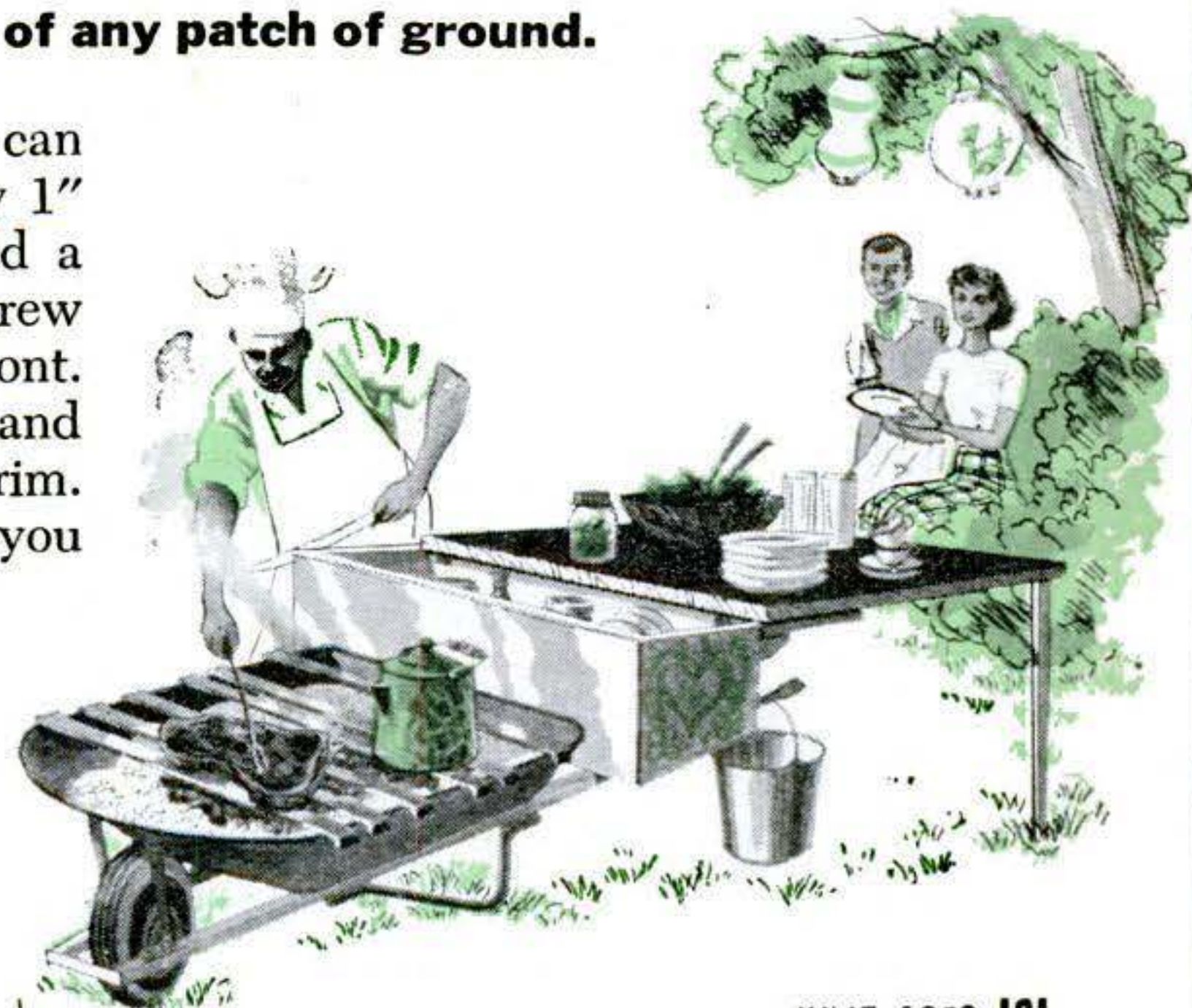
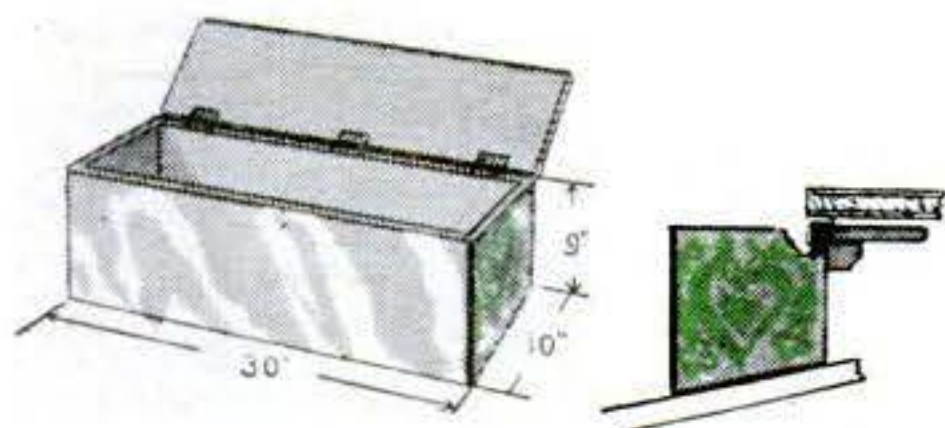


YOUR porch plays a big part in summer living. For privacy, screen it with potted plants, boxed vines or bamboo curtains. Paint house shutters and screens bright colors. And solve meal problems with this serving wagon. Baby-carriage wheels sup-

port a plywood body that has recessed space for a grill or waffle iron and a large compartment for dishes, utensils and food. Two hinged leaves fit over the recessed top and open to form a serving table. The raised bottle shelf holds cups, plates and silver.

**Outdoor grill on wheels makes a campsite of any patch of ground.**

WHEN your metal wheelbarrow isn't busy it can double as a fireplace. Bend six or seven  $\frac{1}{8}$ " by 1" steel strips to fit over the barrow sides. Build a plywood box for the barrow handles and screw a galvanized-iron heat shield to the box front. Remove two legs from an old bridge table and attach metal angles to hook over the box rim. Half fill the barrow with coarse gravel and you are ready for a steak roast in the yard.



## Hard Work Pays Off

**Any camera that will snap Aunt Minnie on the front steps will also take photos that add distinction to your album. Here's how to try your hand at a few like these.**

**A SUNSET SILHOUETTE** usually requires a red or orange filter, but if black storm clouds are building up you can get the picture without a filter. Just figure the exposure as if

you were shooting away from the sun, then underexpose by cutting down the aperture or setting up the speed. To add clouds to your normal landscapes, use a light yellow filter.



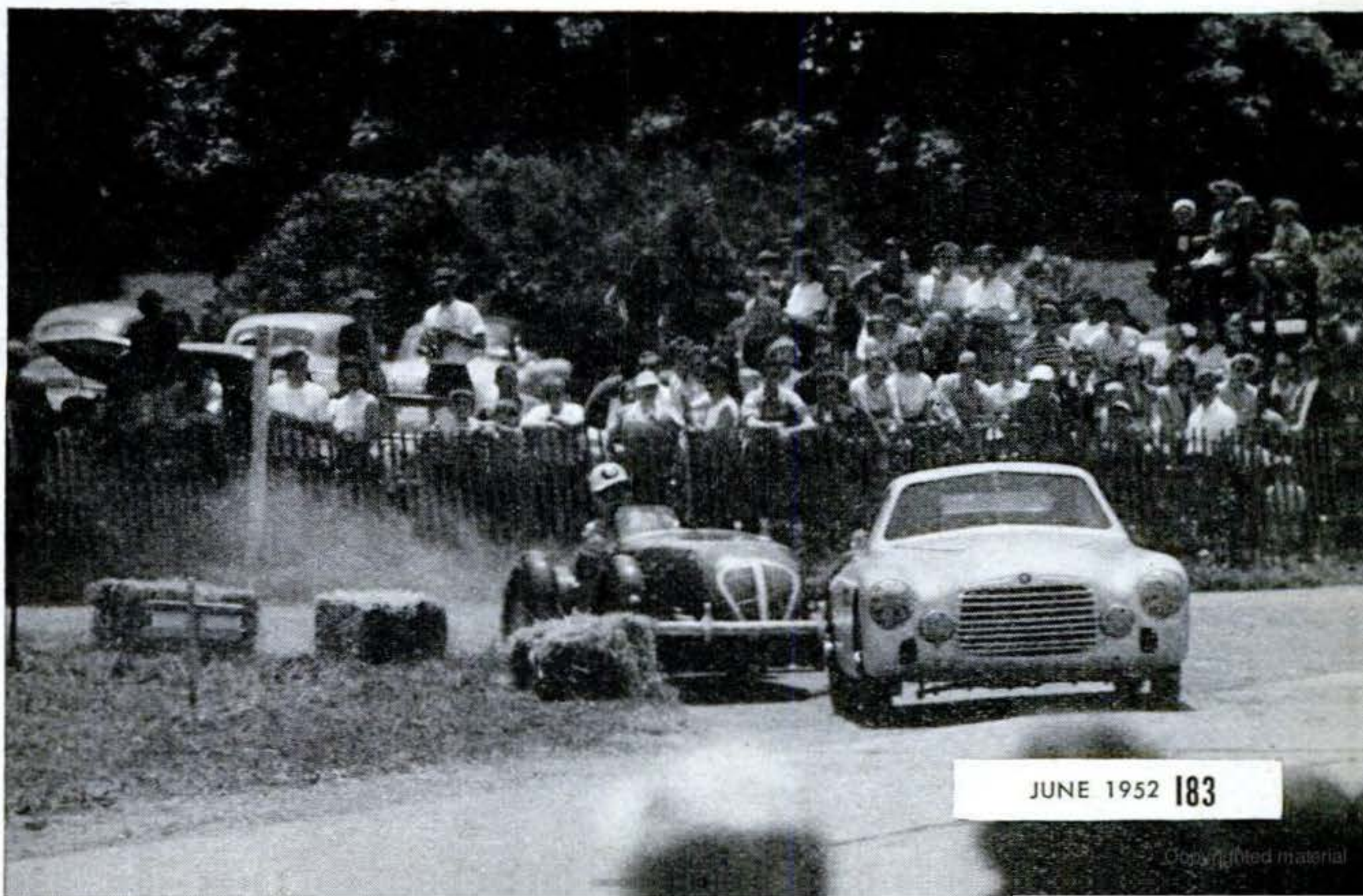




**LIGHTNING** can be shot at night by opening the shutter just before you suspect a bolt is coming and closing it immediately after. If you wait more than a minute, change the film.

**FIREWORKS** must also be taken with shutter opened ahead of time—preferably on signal from the man with the match. Support camera on tripod or table when shooting fireworks or lightning.

**FAST ACTION** can be shot by snapping shutter just before something seems about to happen. If you choose head-on views like one below, you'll get nearly blur-free pictures without a fast shutter.



# Here's How I Show Movies

By Howard G. Heinig

EVERYTHING I NEED, except a screen, is stored in this case. Brass hardware and imitation red leather give case a fine appearance.



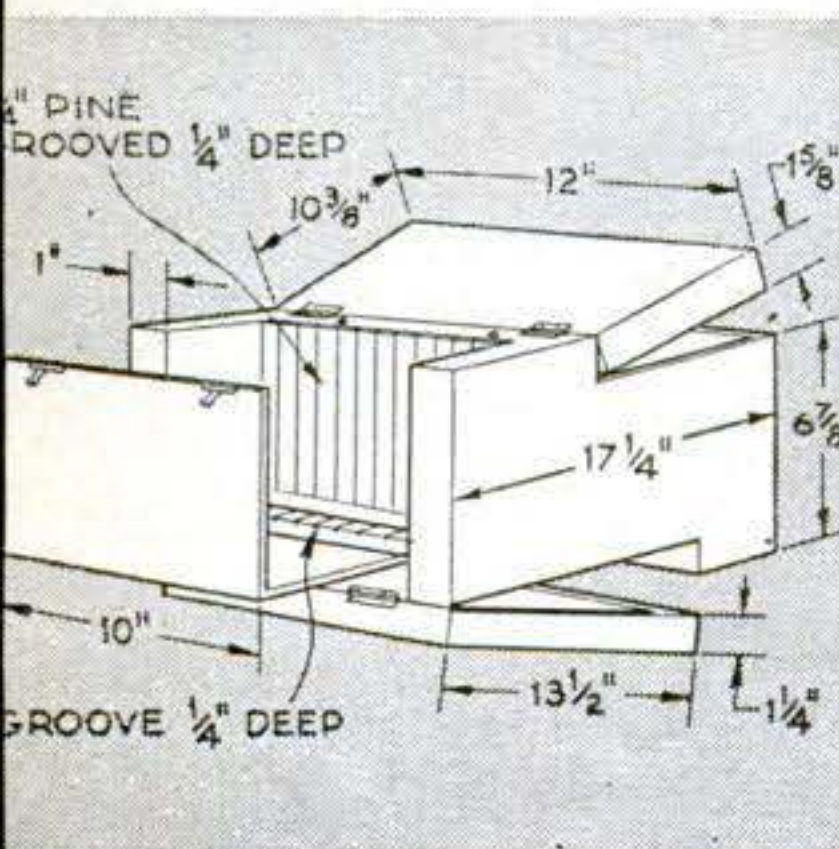
**COLLAPSIBLE LEGS** make it unnecessary to scrounge around for a separate table or stand to support the projector. The legs, taken from an old typewriter stand, fold to fit into shallow compartment on one side of the case.



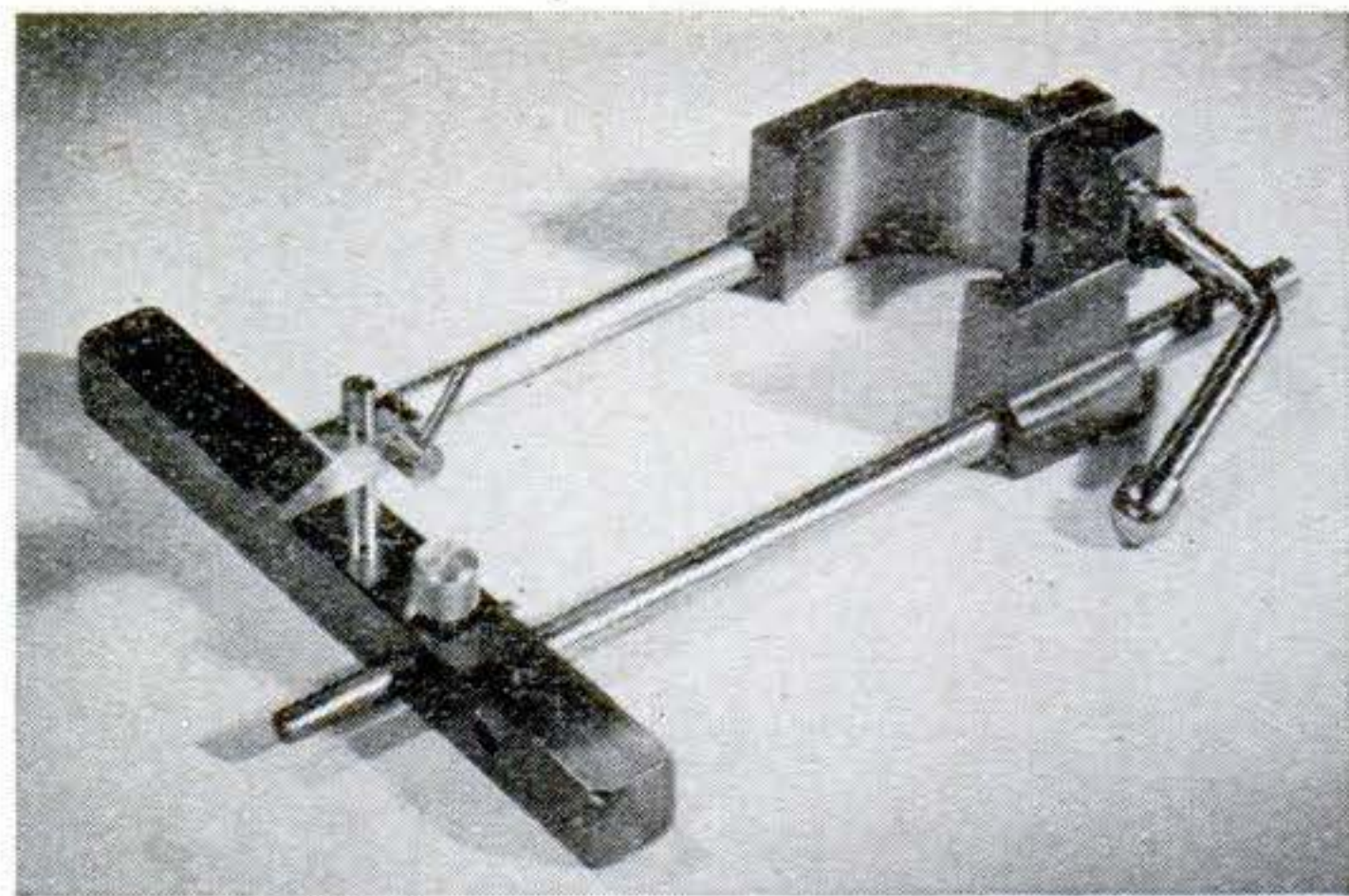
**PROJECTOR** is pulled out after legs are safely supporting the case. Blocks keep the projector from sliding around in transit. By closing the lid after removing the projector, I have a flat surface on which to place it.



**REELS ARE STORED** at the front of case and are easy to reach for changing. Grooves  $\frac{3}{4}$ " deep in rear and bottom of compartment keep reels upright. An L-shaped cover latches at top and opens on hinges at the bottom.



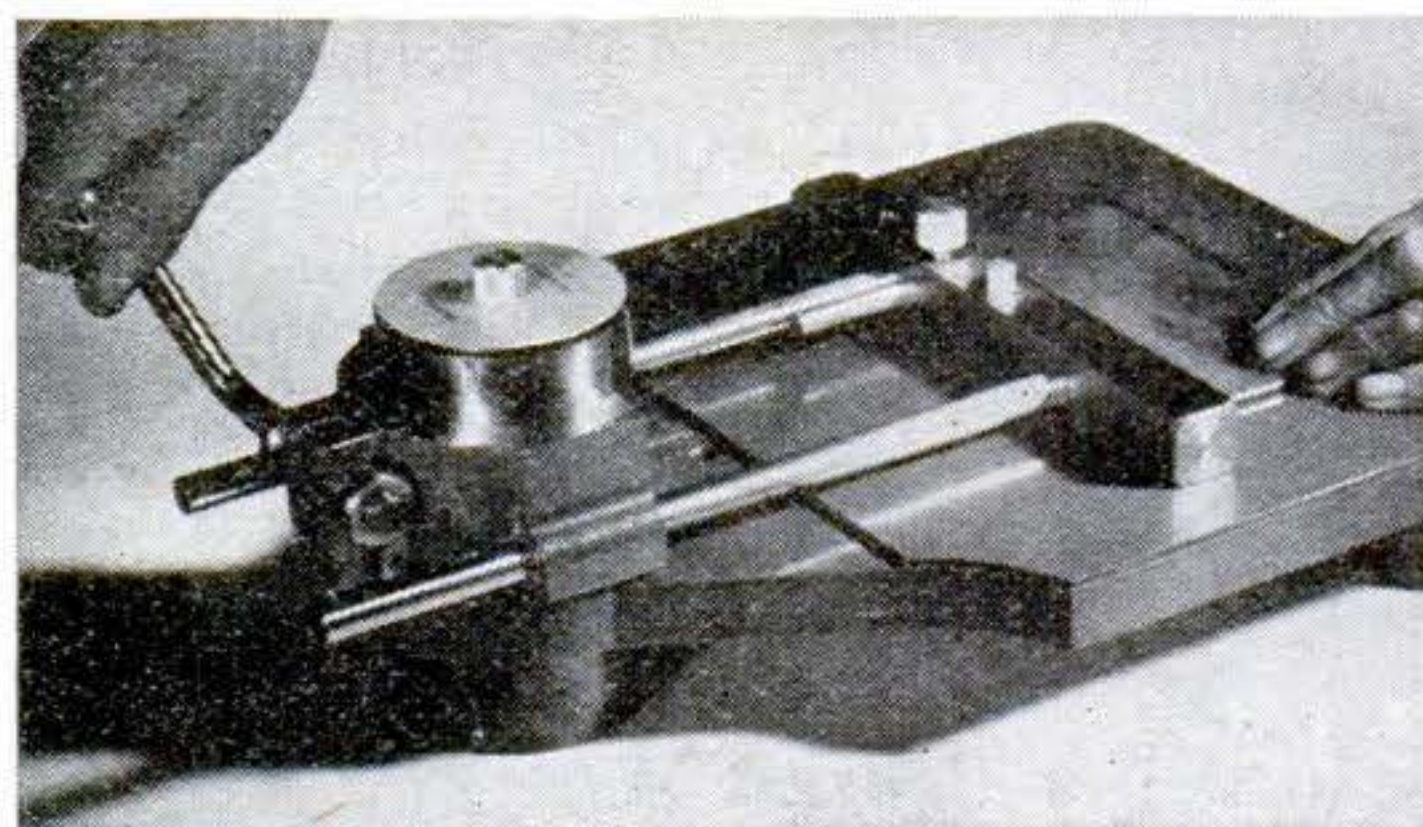
**I BUILT CASE** like this. Except where otherwise noted,  $\frac{1}{4}$ " plywood was used. Dimensions were suited to my Kodascope 8, especially the blocking that holds it in place. Blocks can be sized and located by trial. Position of leg attachments will depend upon legs used.



## Work Holder Fits Drill Press

THIS adjustable work positioner and hold-down saves many clamping setups in the drill press. Loosening the locking lever lets the fixture slide up or down the column with the drilling table. The two positioning rods are also freed and may be extended or pushed back to locate the guide bar. Tightening the lever locks the column clamp and secures the rods by springing them out of parallel.

Work is braced by the guide bar and stop pin to prevent twisting while drilling. A small clamp is locked over the work to keep it from pulling up. This arrangement also speeds up production runs. Invented by Charles Wilson of Bloomfield, N. J., the work holder is not in production as yet.

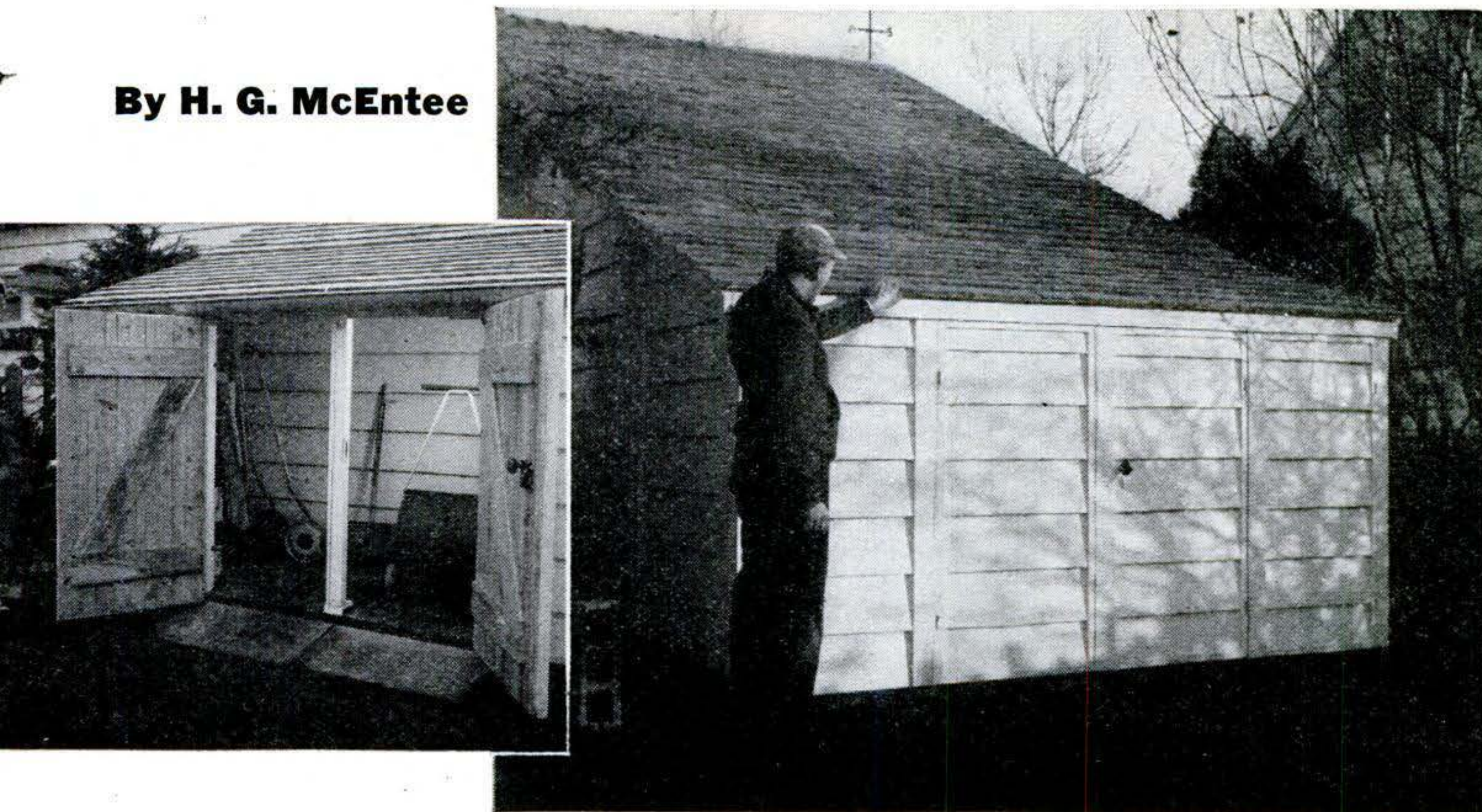


## Workshop Wisdom



*One Saturday J. Otis Bracks  
Raised his car up with two bumper jacks.  
While under it snug,  
On a wrench he did tug.  
Now his widow is wearing his slacks.*

By H. G. McEntee



# How to Expand a Garage

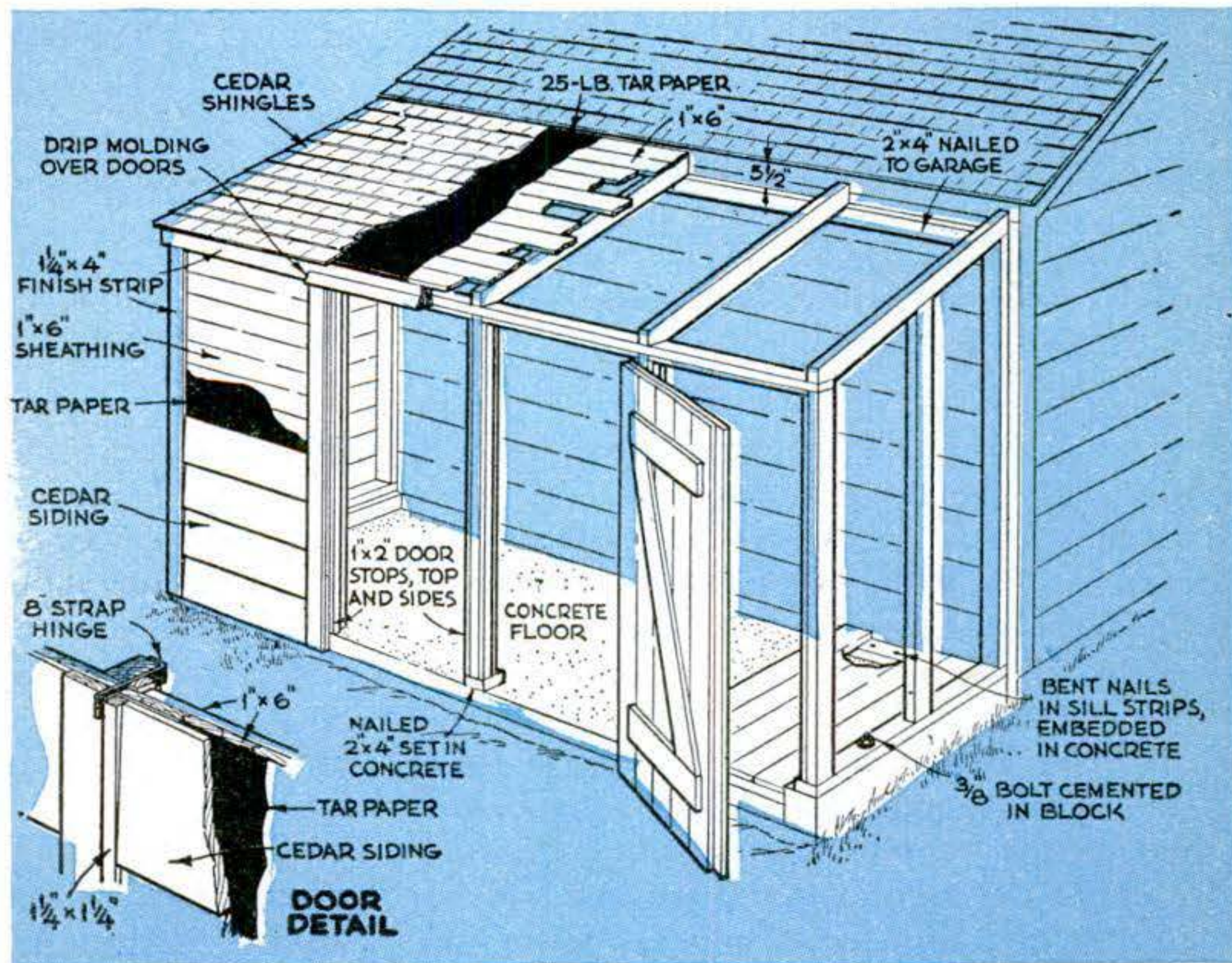
**A bustle on back takes a longer car or stores extra yard tools.**

**M**Y GARAGE has been shrinking for years. I have nibbled the floor space to store window screens, the lawn mower, garden tools and dozens of other house and

yard essentials. And all the while cars have been growing.

My latest car brought matters to a head. When I found that I couldn't get it in and

**SHED** built on back of garage gets part of its support from common wall and part from sound concrete and cinder-block foundation. Four-inch-high concrete floor keeps shed dry. Cinder blocks are one course higher on sides than in back; otherwise foundation is same as shown in cutaway on page 188. This general plan can be adapted to most structures, though details may vary.





**1 FOUNDATION TRENCH** outlines the new extension. Dig it below frost line and about a foot wide. Pour in concrete footing and level it off 20" below the ground.



**2 CINDER BLOCKS** are laid on top of footing. Staked cords, carefully leveled, help to align blocks vertically and horizontally. I built sides one course higher than back.



**5 ROOF BOARDS** laid over rafters are 1" by 6" tongue-and-groove. They overhang a little at sides and rear. Same stock is used to form sheathing on both sides.



**6 TAR PAPER** is tacked to roof boards and side sheathing and secured under 1 1/4" by 4" finish strips. Weighted boards on roof keep paper from blowing loose.

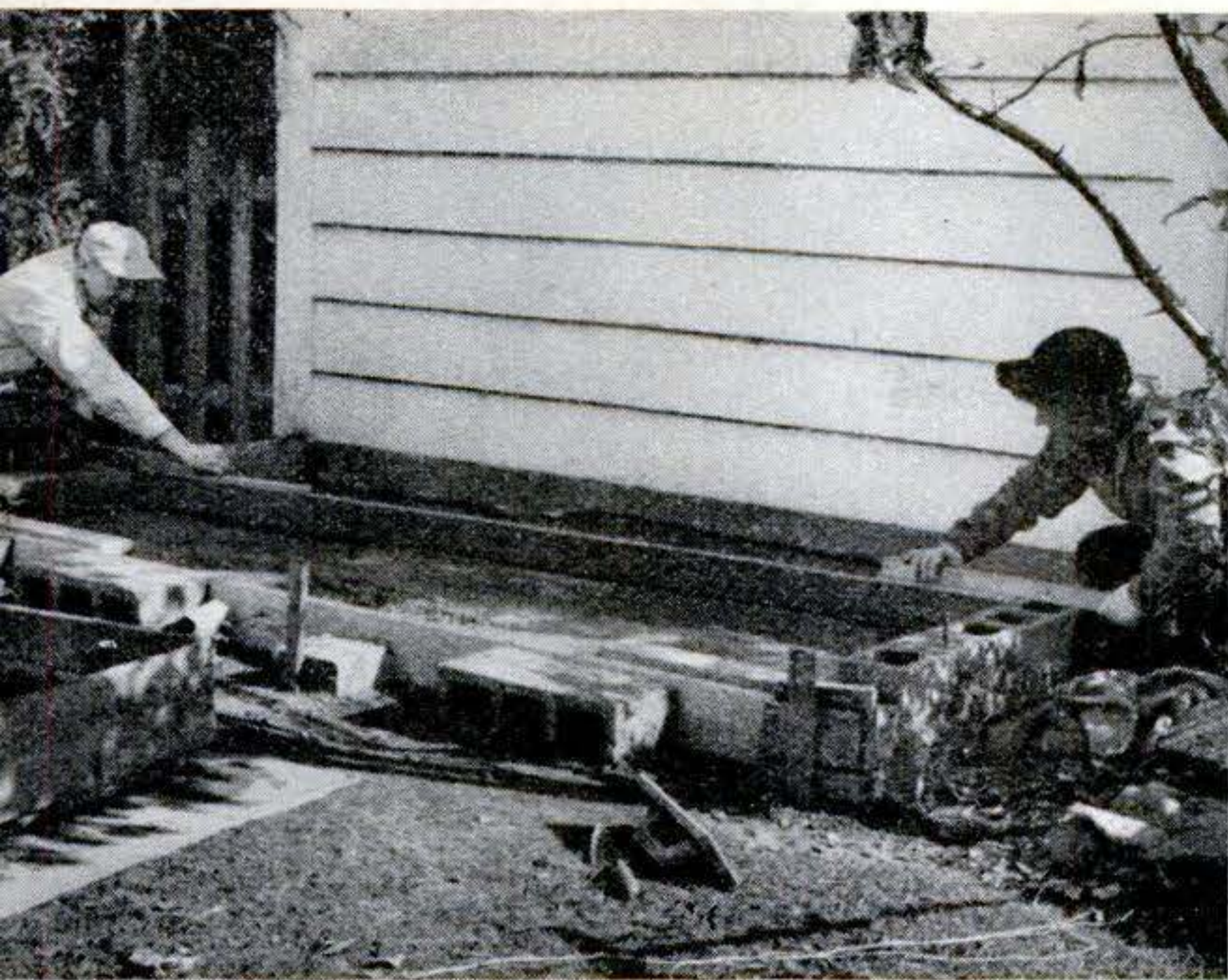
me out I knew the garage would have to grow with the times.

It has. These pictures show how I worked out an addition that should lick my storage problem for the future. If your garage is busting at the seams, you may be able to push out one wall in the same way.

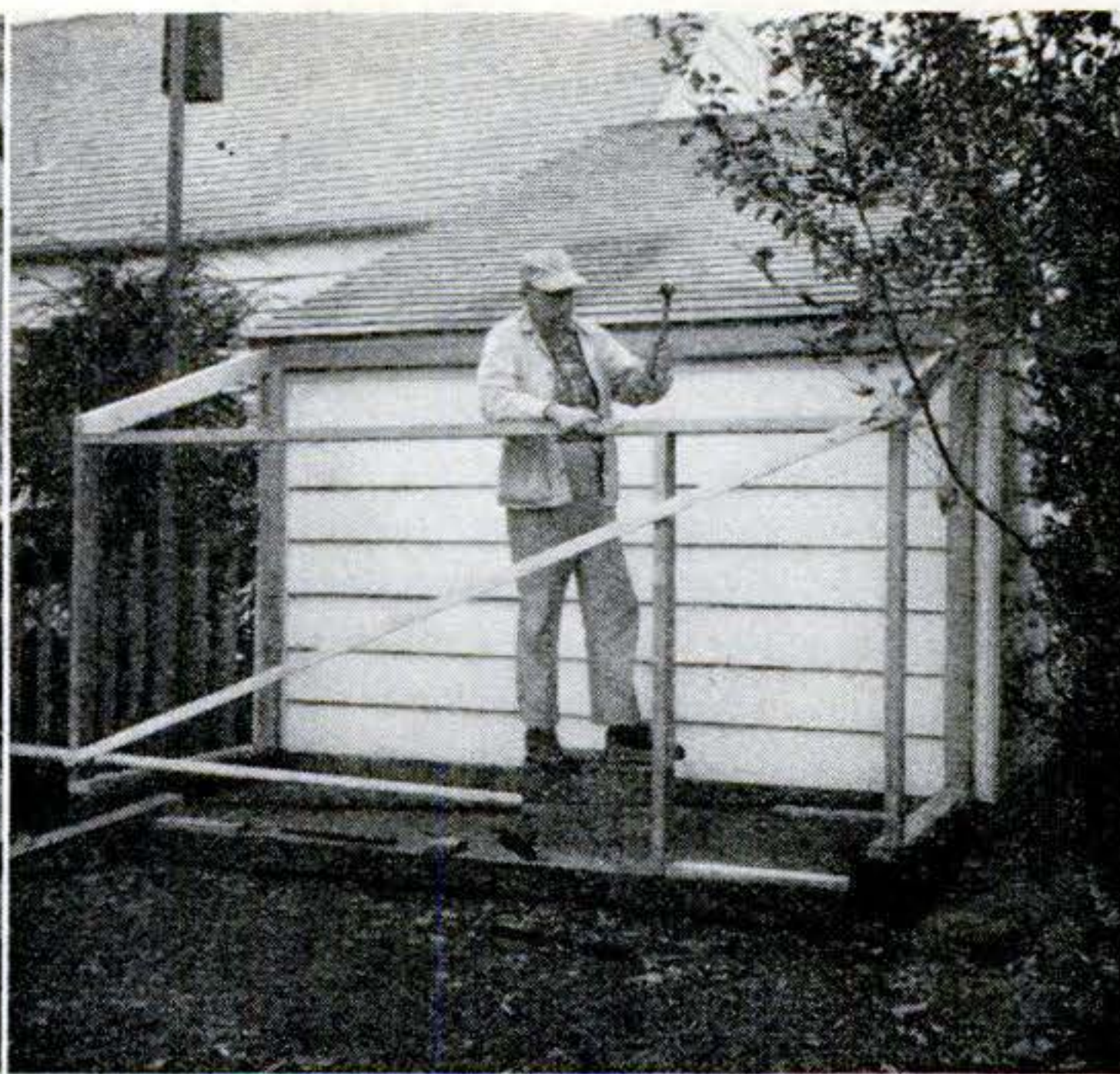
**Which extension?** I left the original walls of my garage intact and hung a tool shed on the back. It has separate doors so I can get things in and out without moving or scratching the car. Tools are better pro-

tected against moisture and rust because they are separated from the rain and snow that ride in on a car. The shed is perfect for my needs because the garage is big enough for my car alone.

If you are in the same spot, I suggest a shed. But if you own a short garage or a long car you will have to push back the garage wall. Drawings on the following pages show what you have to do to park fishtail fenders in a Model T garage. The job is a little more difficult because you have



**3 CONCRETE FLOOR** about 4" thick is poured and spread level. It covers rear row of cinder blocks; wood brace in back completes the pouring form for the new floor.



**4 FRAMEWORK**, made of two-by-fours, is anchored to garage by corner studs and crosspiece nailed under eave. Crosspiece and plate (being nailed on) support rafters.



**7 BEVELED CEDAR SIDING**—picked to match original finish of garage walls—fits snugly between vertical finish strips. Siding is lapped, installed from bottom up.



**8 ROOF SHINGLES** also match garage. Begin with double row at bottom and space courses evenly. Saw last two rows to fit tightly under eave. If fit is loose, install flashing.

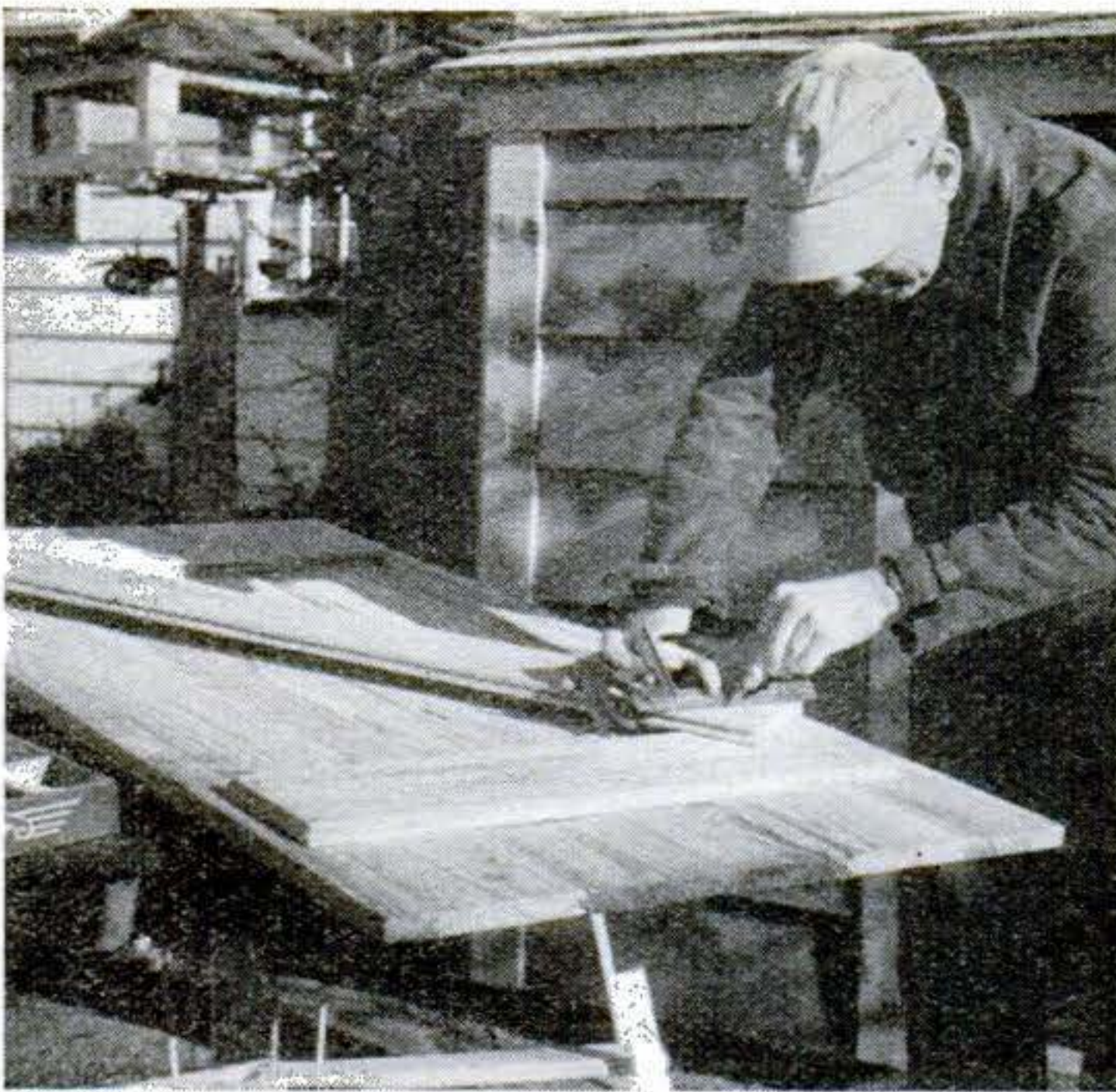
to remove a wall and reinforce the original structure. But part of this extra work is canceled out because you don't need new doors.

**Dimensions.** A shed or bustle might just as well run the full width of the garage. Height may be limited by roof pitch and special uses. I planned mine high enough at the back to accommodate a vertical rack for window screens and storm sash.

**Foundation.** The floor and footing of the extension should match those of the

garage itself. Square off a rectangle extended from the present walls and dig a 12"-wide trench below the frost line. Pour a concrete footing into the trench and lay courses of cinder block to the height of your garage-wall foundation. I made the sides one course higher than the back. If you are building a drive-in bustle, lay the cinder block to the same height all around.

Pour a 4"-thick concrete floor and run the concrete over the rear row of cinder blocks. While the mix is wet, drive nails through



**9 DOOR BACKINGS** are 1" by 6" roof boards battened and braced together. Plywood or other sheet stock would also do. Doors should overhang raised concrete floor.



**10 TRIAL FITTING** of doors is necessary to get size and hinge position just right. When finished, these doors are heavy, so use sturdy strap hinges about 8" long.

two-by-four sill strips, bend the nails and embed them in the floor.

**Frame.** To make the shed roof a smooth continuation of the garage, I nailed a two-by-four across the garage wall 5½" below the shingle line. This allows height for two-by-four rafters (on edge), 1" roof boards and two thicknesses of shingles. The combination fits snugly under the garage roof overhang so I did not use any flashing at the joint.

Five studs at the back of the shed frame

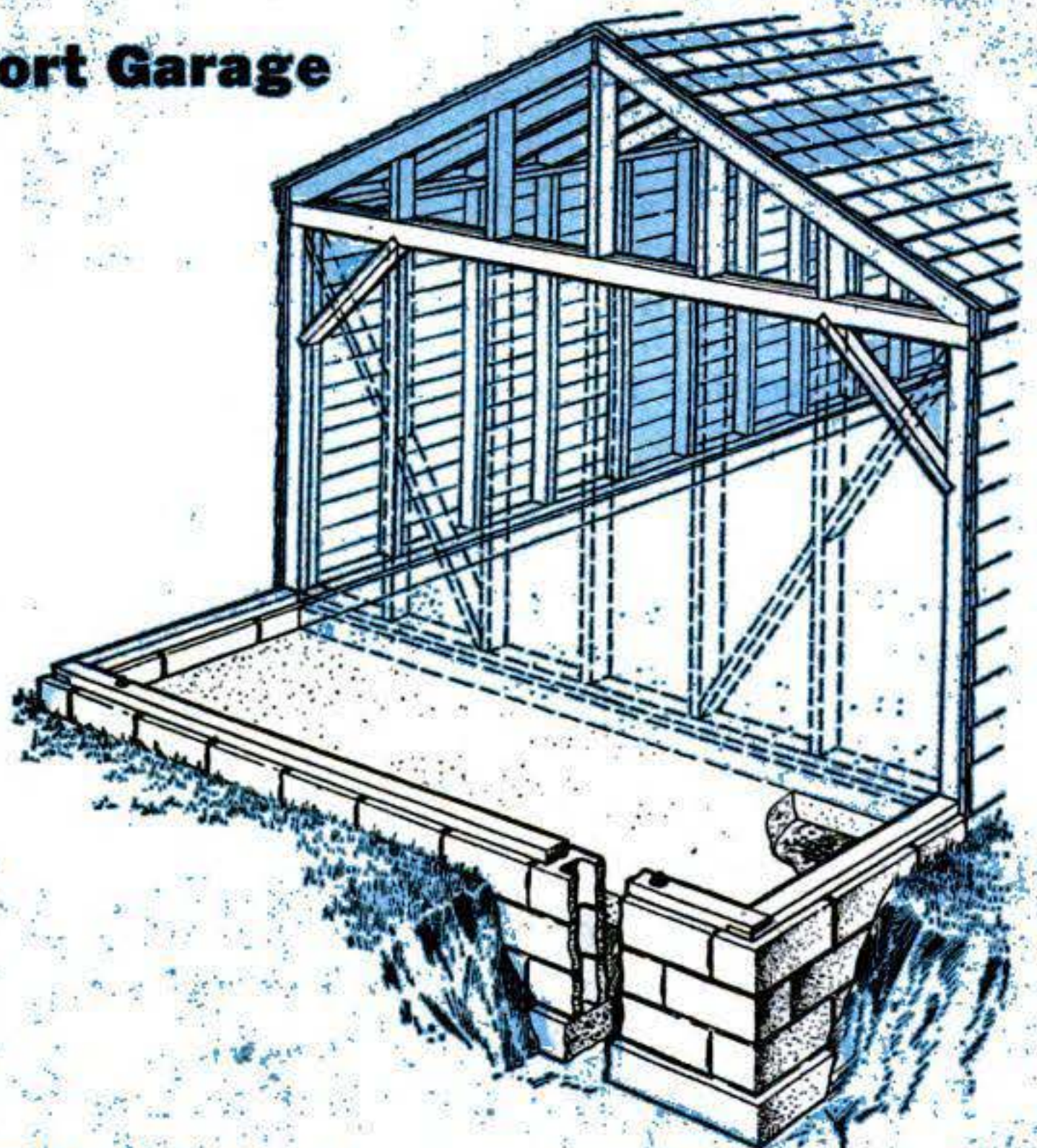
the doors and support a two-by-four plate. Rafters run from this plate to the two-by-four nailed to the old garage wall.

**Roof and walls.** Roof and sides are sheathed with 1" by 6" tongue-and-groove and covered with 25-lb. tar paper, battened with 1¼" by 4" finish strips. I shingled the roof and nailed beveled cedar siding between the finish strips. Siding and shingles match my garage.

**Materials.** In figuring quantities of mason materials, remember that standard

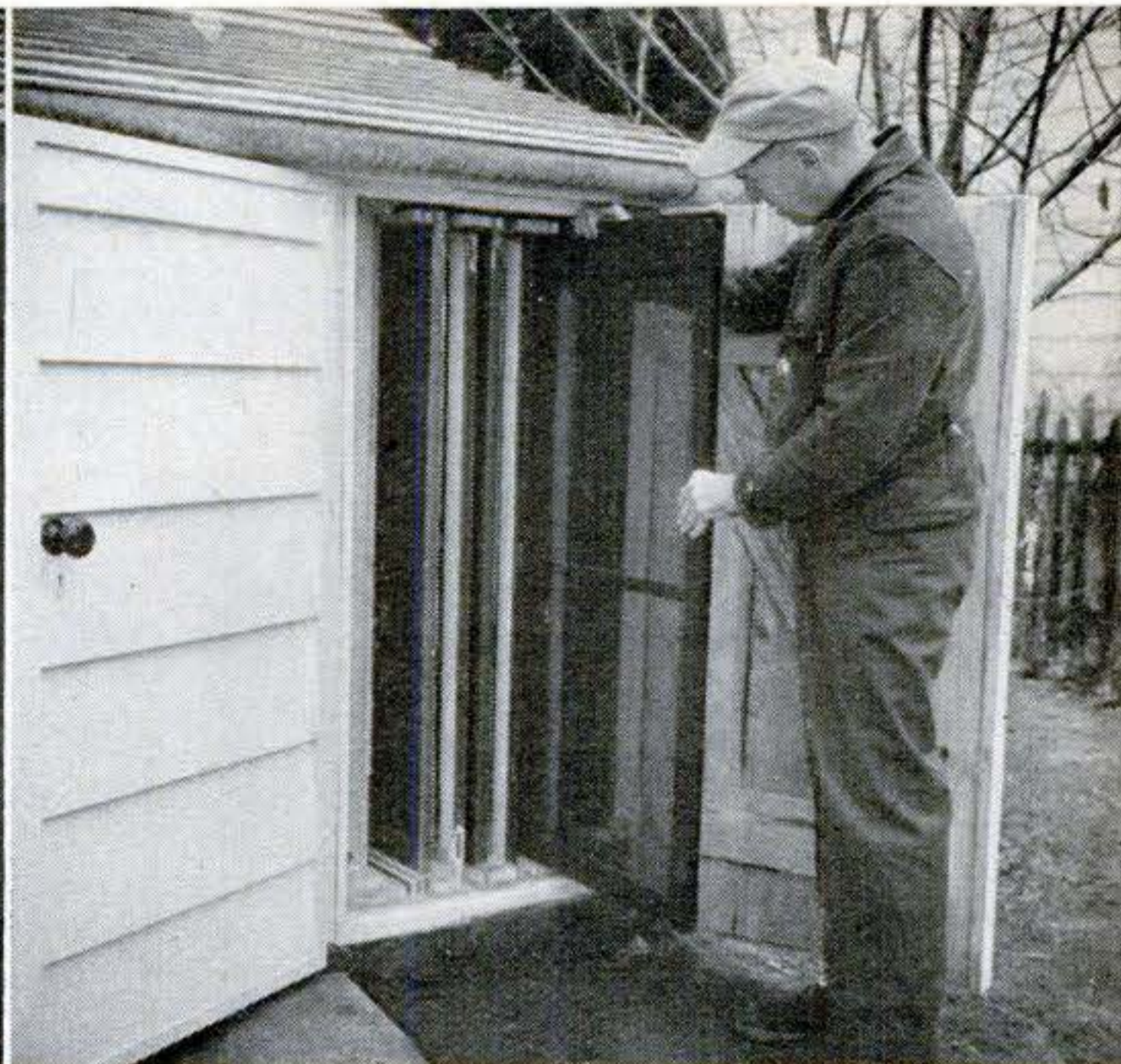
## How to Fit That New Car in a Short Garage

A DRIVE-IN bustle involves removing at least part of the rear wall of the garage and then reinforcing the roof supports. Dotted lines in first drawing at right show where studs and foundation must be removed. Horizontal plate across top is also taken out and replaced by two two-by-fours on edge. Diagonal corner braces hold new plate. Heavy lines in framework drawing (center) indicate new construction. Sills are held by bolts cemented into cinder blocks. Note that rafters are notched where they meet plates. Studs in center of side walls are also notched into rafters. (In this garage modification, car trunk or hood goes under plywood shelf; storm windows or screens are stored above.) Roof and sheathing can be added as shown at extreme right. Siding should match garage. If shed roof is not extension of garage's, inexpensive roll roofing can be substituted for shingles.





**11 DOORS ARE FINISHED** like walls, with tar paper, 1 1/4" edging strips and cedar siding. Add siding and last edge after you bolt or screw on the hinges.



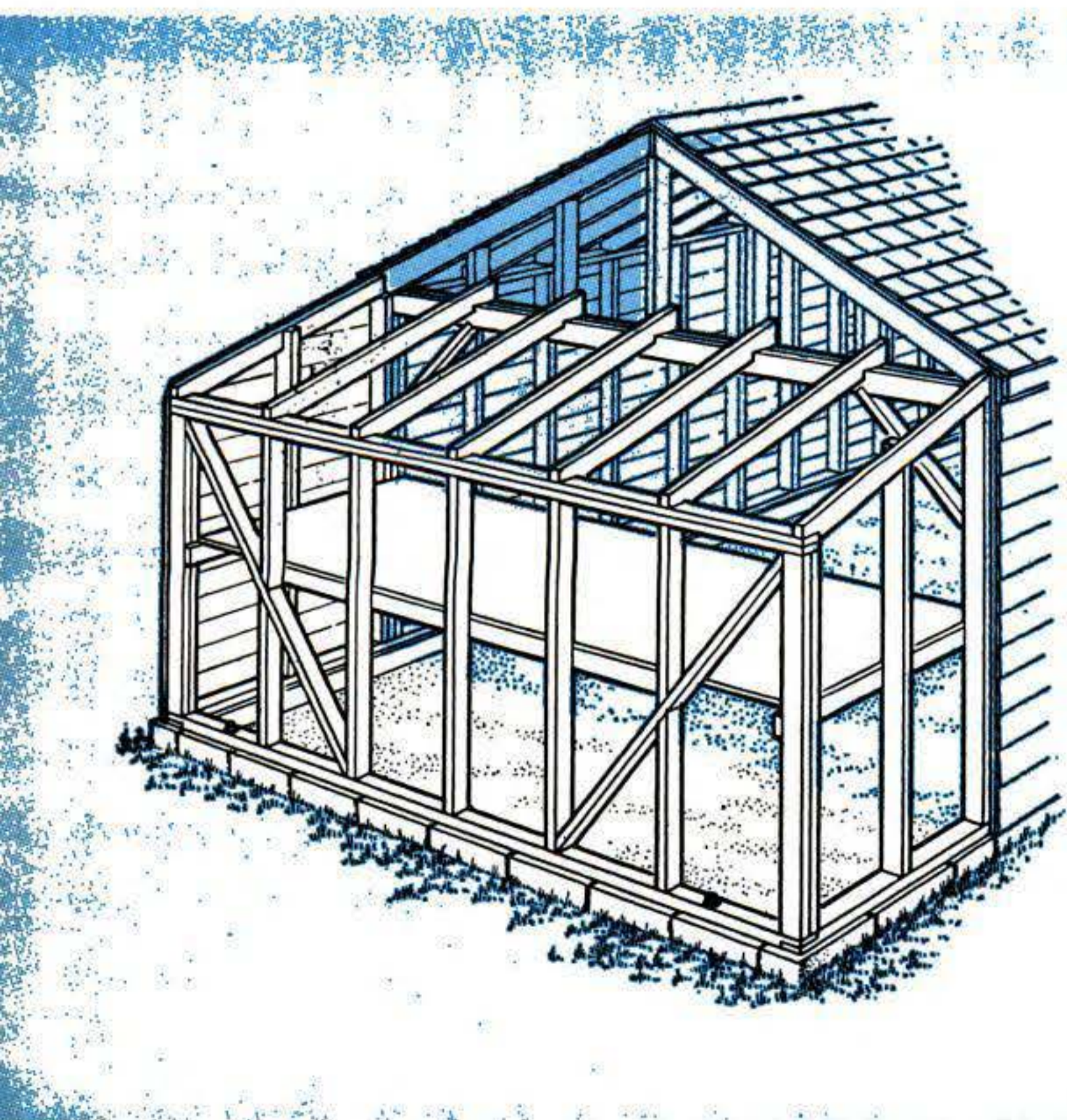
**12 SCREEN AND STORM-SASH RACK** occupies closed-in space behind third door. I planned this from the beginning, made sure roof would be high enough to take it.

cinder blocks are 7 7/8" by 7 7/8" by 15 5/8". Allow 1/2" for mortar where blocks meet. Cinder blocks can easily be broken with hammer and chisel. Figure the *volume* of cement mix you will need for the foundation and floor and let your supplier calculate quantities. For the footing use one part cement, three parts sand and five gravel. Lay cinder blocks with a fairly dry mortar of one part cement and three sand. You can make a good mix for the floor from one part cement, two sand and four gravel.

Order shingles, siding and roof boards by *area*. Tell your lumberman how many square feet you want to cover. Buy two-by-fours and finish strips by total length—allowing a margin for waste. The cheaper grades of lumber will save plenty of money and the knots won't matter.

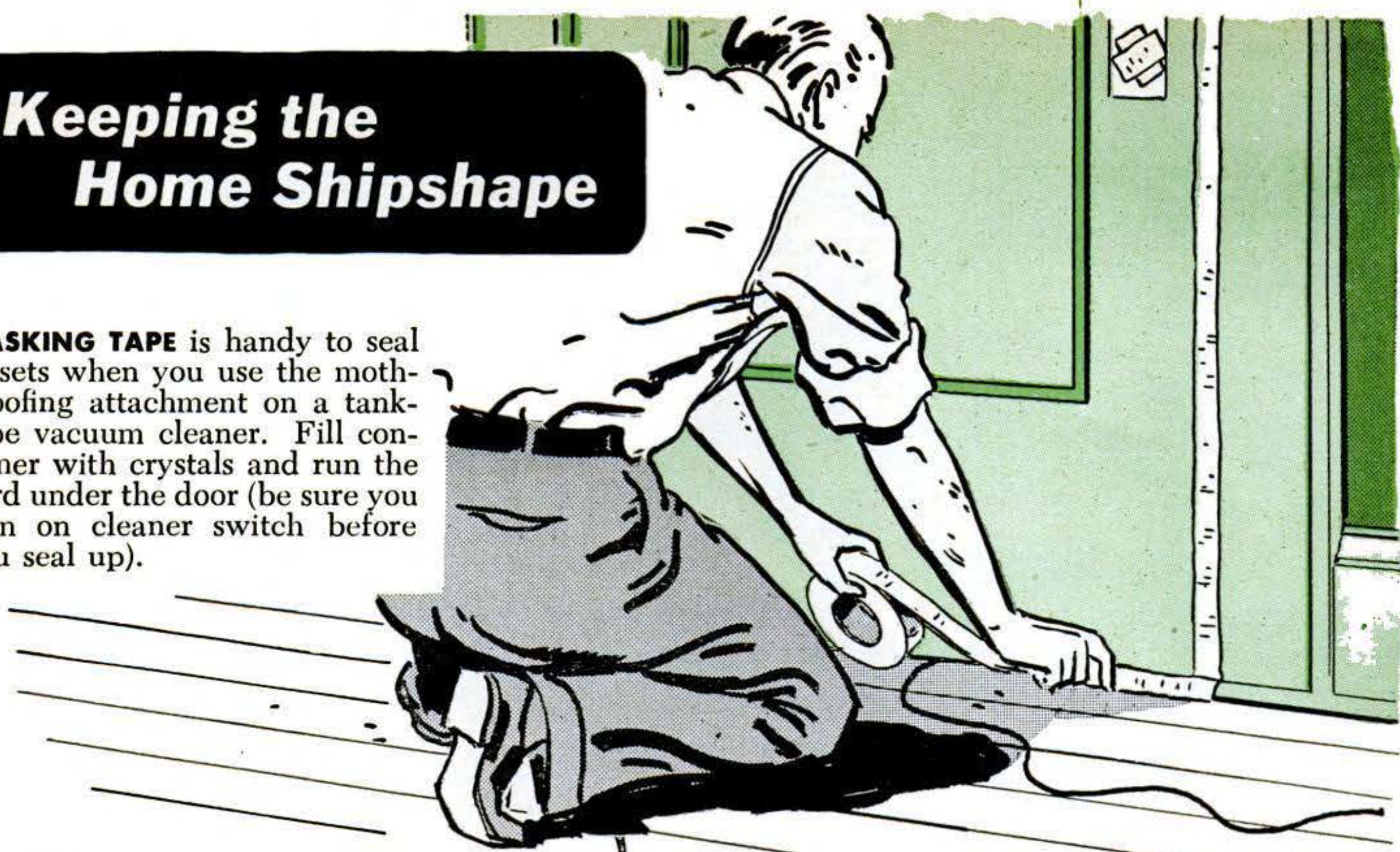
If you remove the back wall of the garage to run the bustle straight through, bear in mind that you can reuse the studs, siding and some of the other lumber that you take out of the old wall.

END

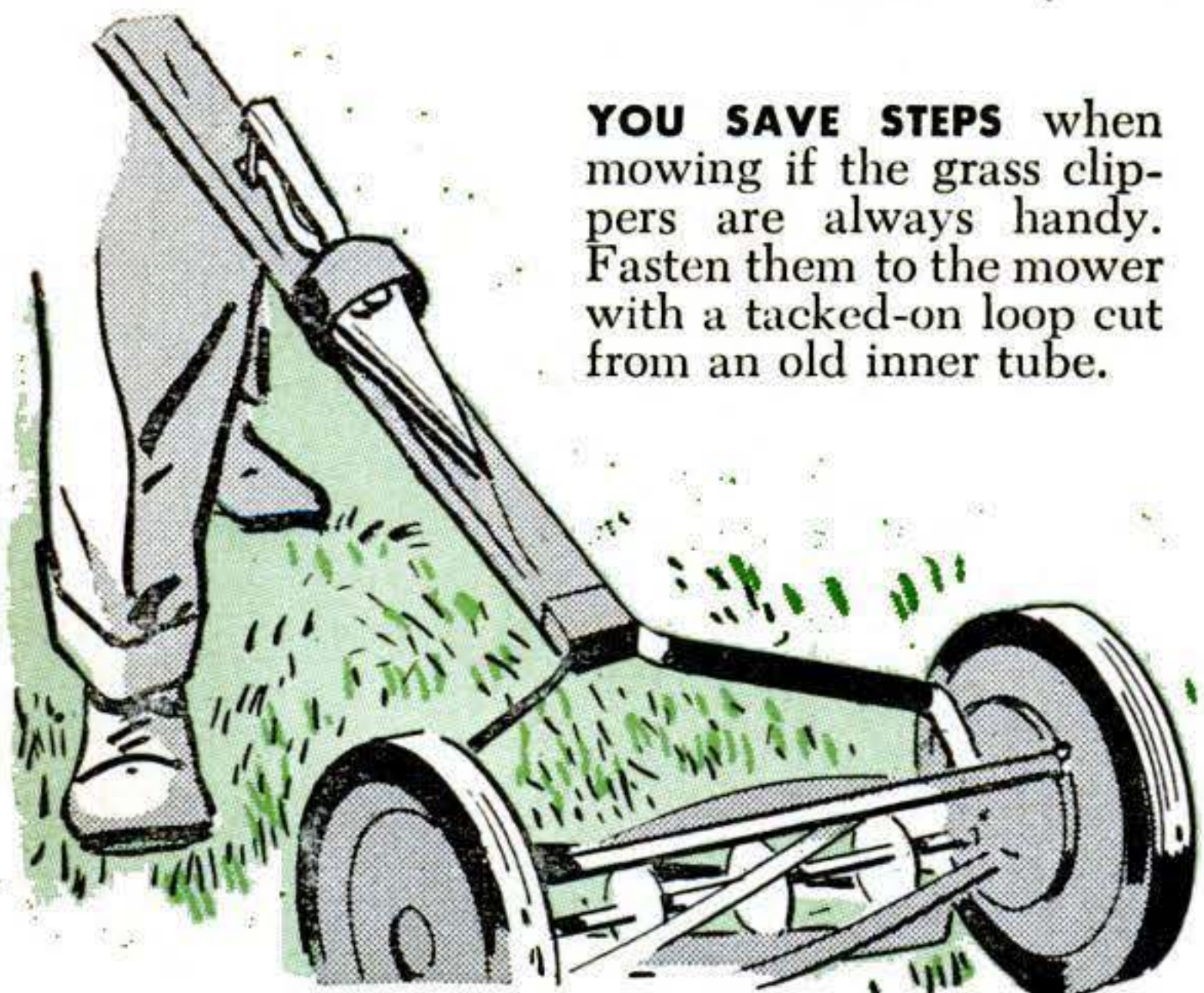


## Keeping the Home Shipshape

**MASKING TAPE** is handy to seal closets when you use the moth-proofing attachment on a tank-type vacuum cleaner. Fill container with crystals and run the cord under the door (be sure you turn on cleaner switch before you seal up).



**YOU SAVE STEPS** when mowing if the grass clippers are always handy. Fasten them to the mower with a tacked-on loop cut from an old inner tube.



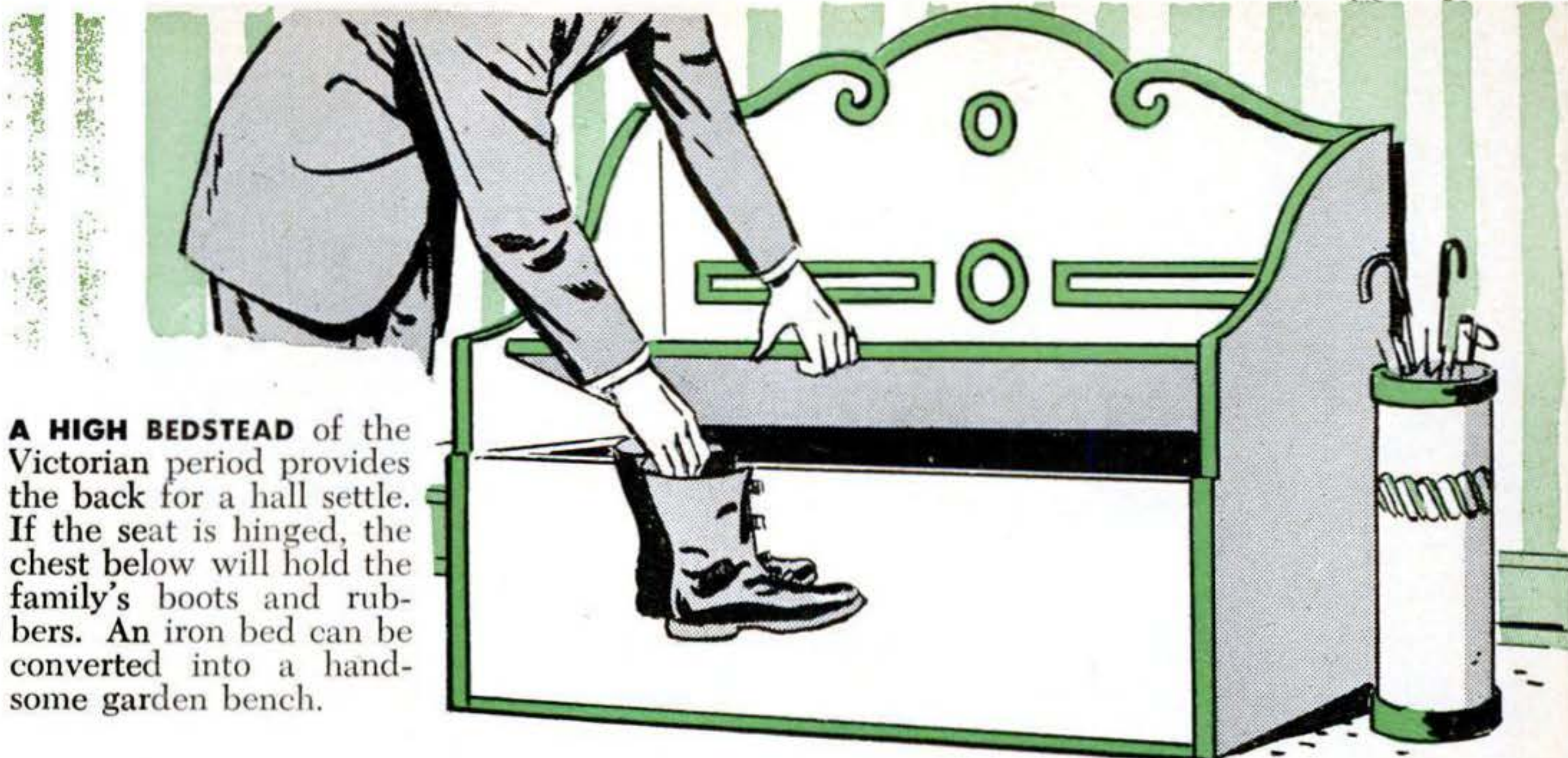
**HOOKED RUGS** that have become limp and refuse to lie flat will be given more body if several coats of shellac are applied to the burlap backing.

**A NEAT SOAP-FLAKE DISPENSER** for a bathroom is a syrup pitcher with a sliding top. It will rid the room of a bulky and unsightly box.



**WHEN PULLING NAILS** from furniture or woodwork, you can avoid marring the finish by slipping a rubber door wedge under the head of the hammer.



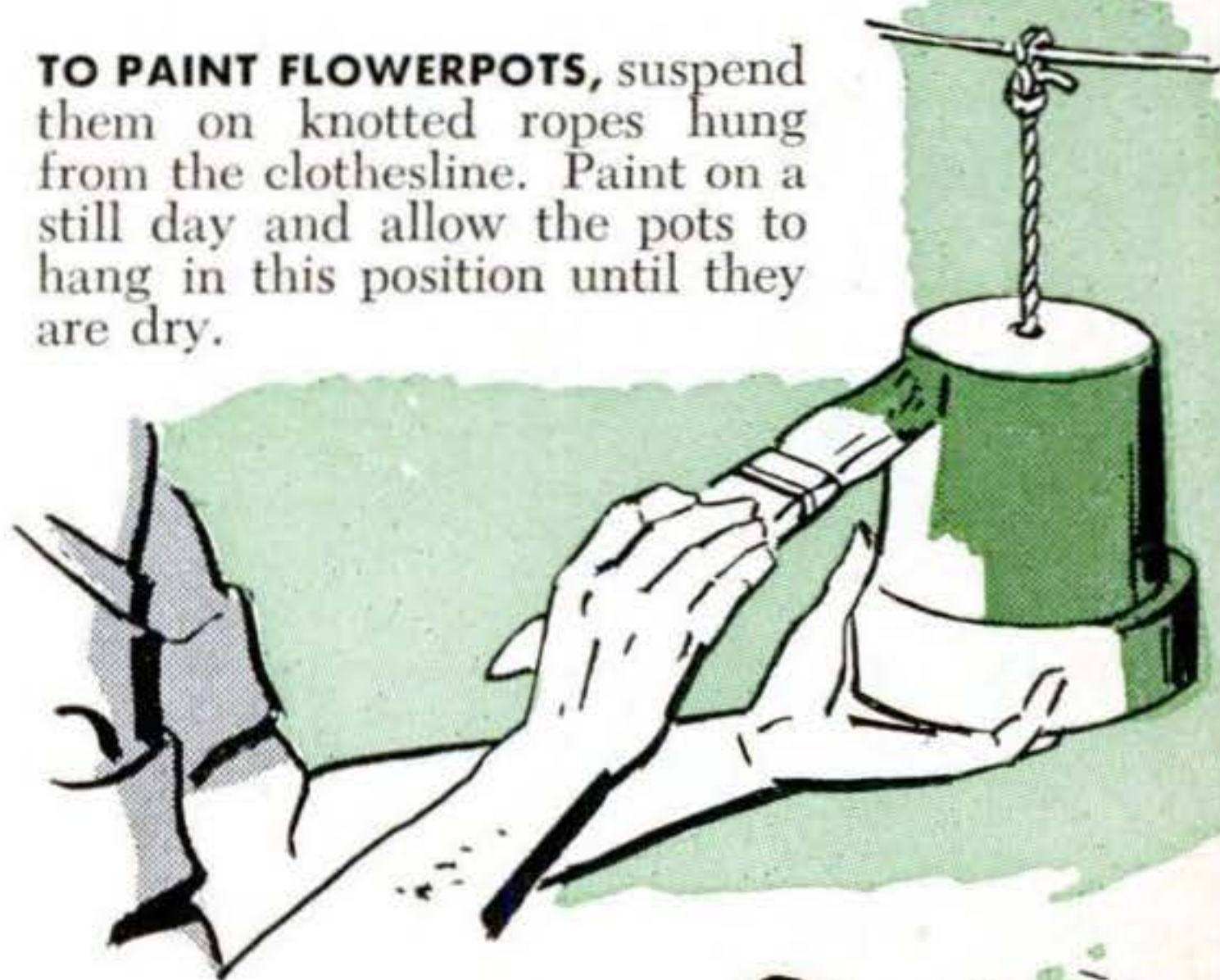


**A HIGH BEDSTEAD** of the Victorian period provides the back for a hall settle. If the seat is hinged, the chest below will hold the family's boots and rubbers. An iron bed can be converted into a handsome garden bench.

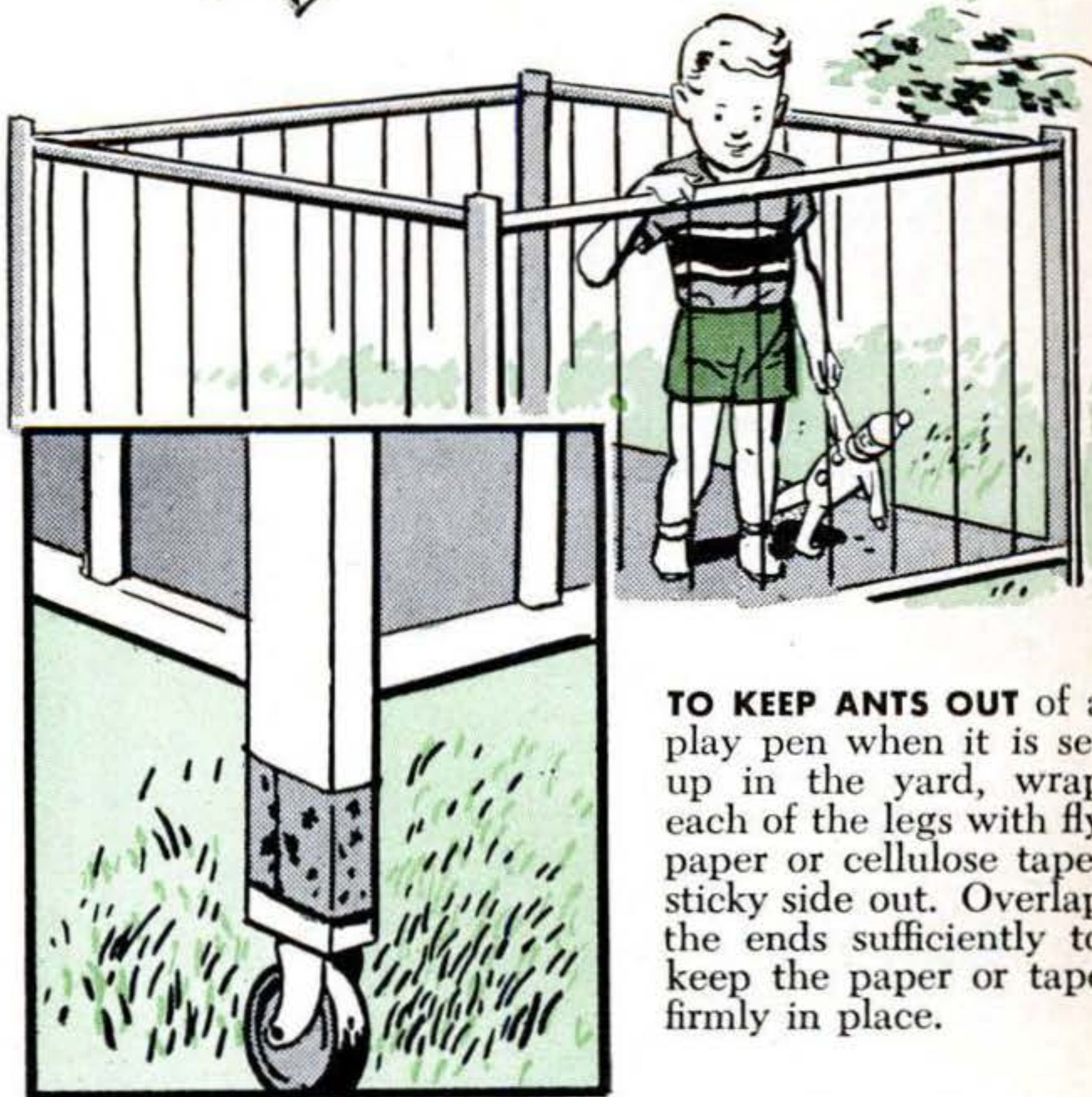


**RUBBER GLOVES** will wear longer if they are turned inside out as they are stripped off, then left reversed for the next wearing. This gives each glove equal use on the right hand.

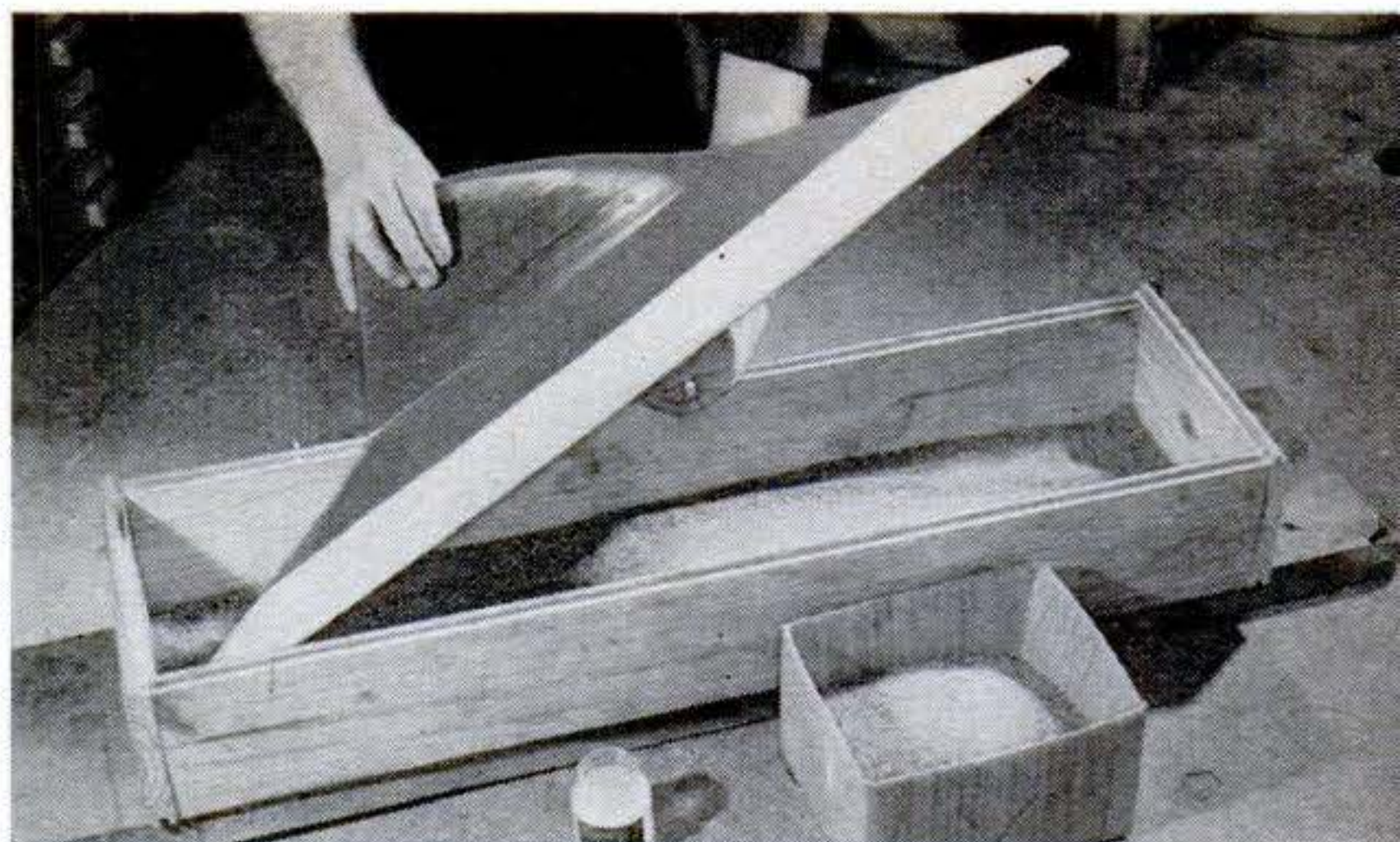
**TO PAINT FLOWERPOTS**, suspend them on knotted ropes hung from the clothesline. Paint on a still day and allow the pots to hang in this position until they are dry.



**MINOR SCRATCHES** on furniture can be camouflaged by rubbing linseed oil into them with the tip of the finger. In a few days the oil hardens, forming a permanent seal.



**TO KEEP ANTS OUT** of a play pen when it is set up in the yard, wrap each of the legs with fly paper or cellulose tape, sticky side out. Overlap the ends sufficiently to keep the paper or tape firmly in place.



**1 HULL TO BE COPIED** is smeared with petroleum jelly and placed in mold box—four sides set on a plank. Fill bottom of mold box with sand that can be packed around deck fittings to make hull lie even.

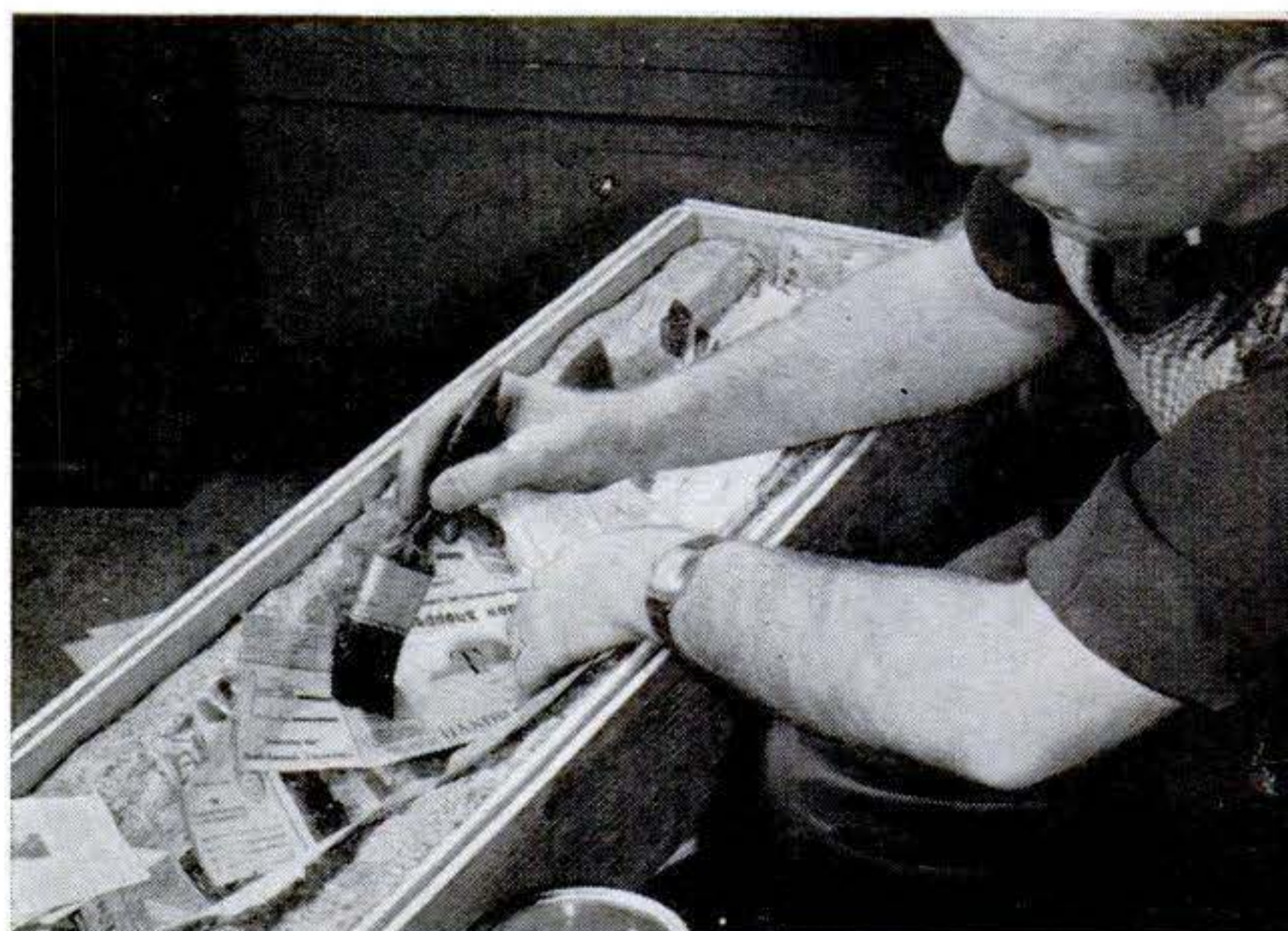
# Newspaper Boats Are a'Comin'

**Laminated model boats are not only in style—they're easy to build, too.**

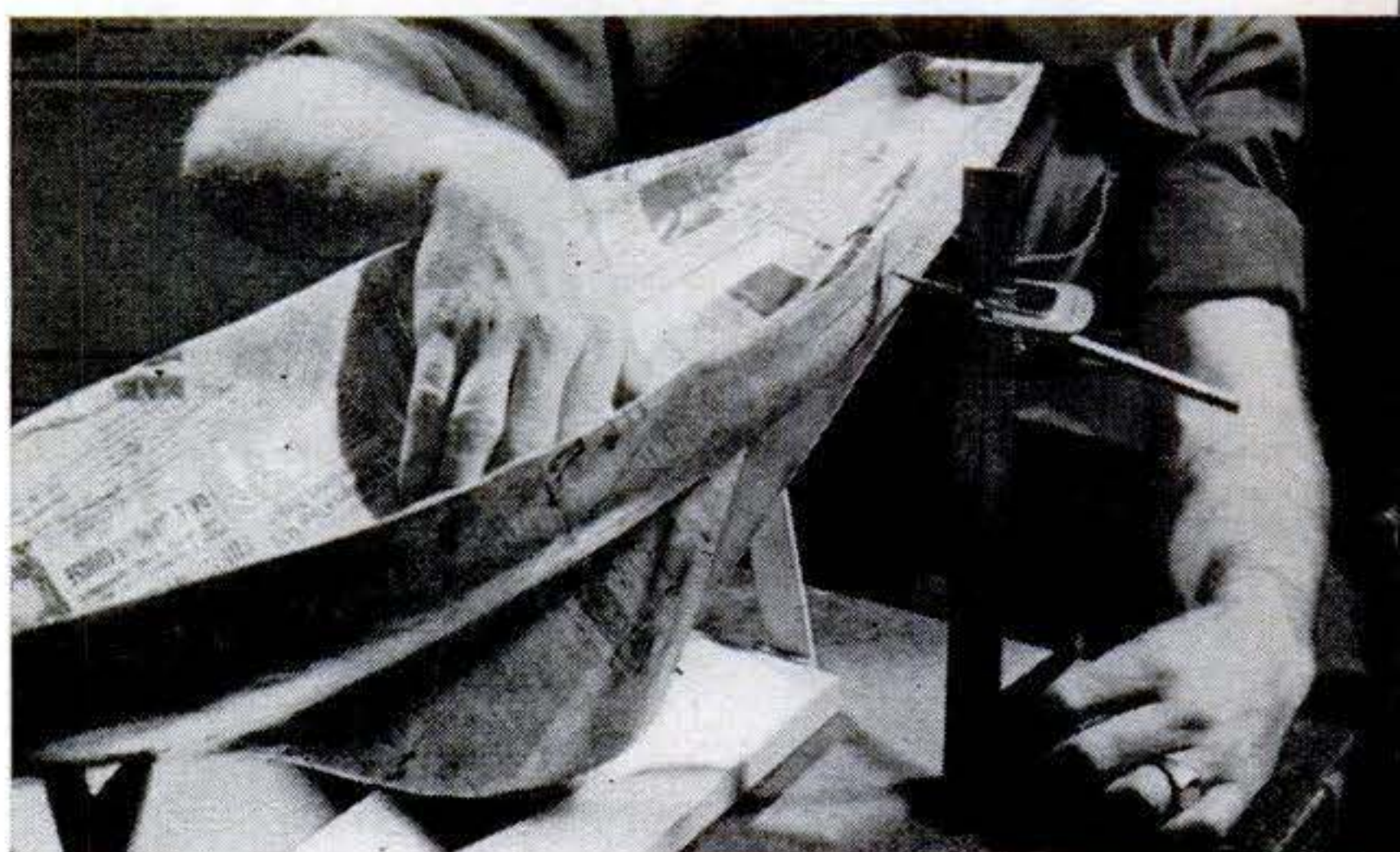
**T**HE latest in big-yacht construction is reinforced laminates—usually glass fibers bound by plastic resin. Here is how you can use the same principle to make a model-boat hull, with paper instead of glass fibers.

The strips are cemented together in a hollow plaster mold that can be made by using an existing boat as a master pattern. Even if you have to shape a solid wooden master, the job is no harder than conventional construction.

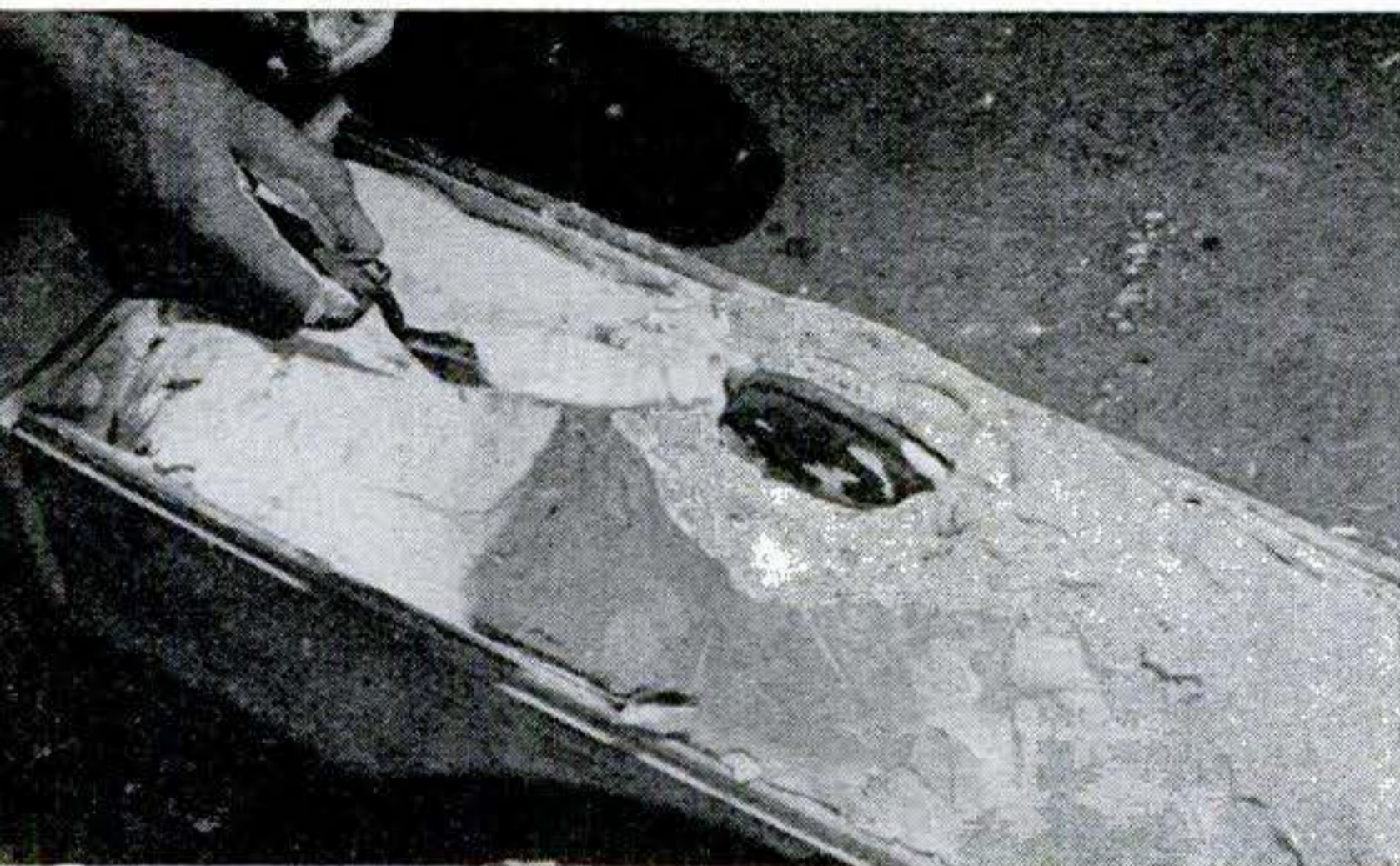
For this 35" sloop I borrowed a wooden hull, made a plaster cast of it, and then built up my own hull in the mold. I used ordinary water glass (sodium silicate) as the adhesive, adding two ounces of glycerine per quart to prevent brittleness. Kraft paper is stronger than newsprint, though harder to use, and other adhesives would do as well—*Floyd R. McGuckin, Ridgewood, N.J.*



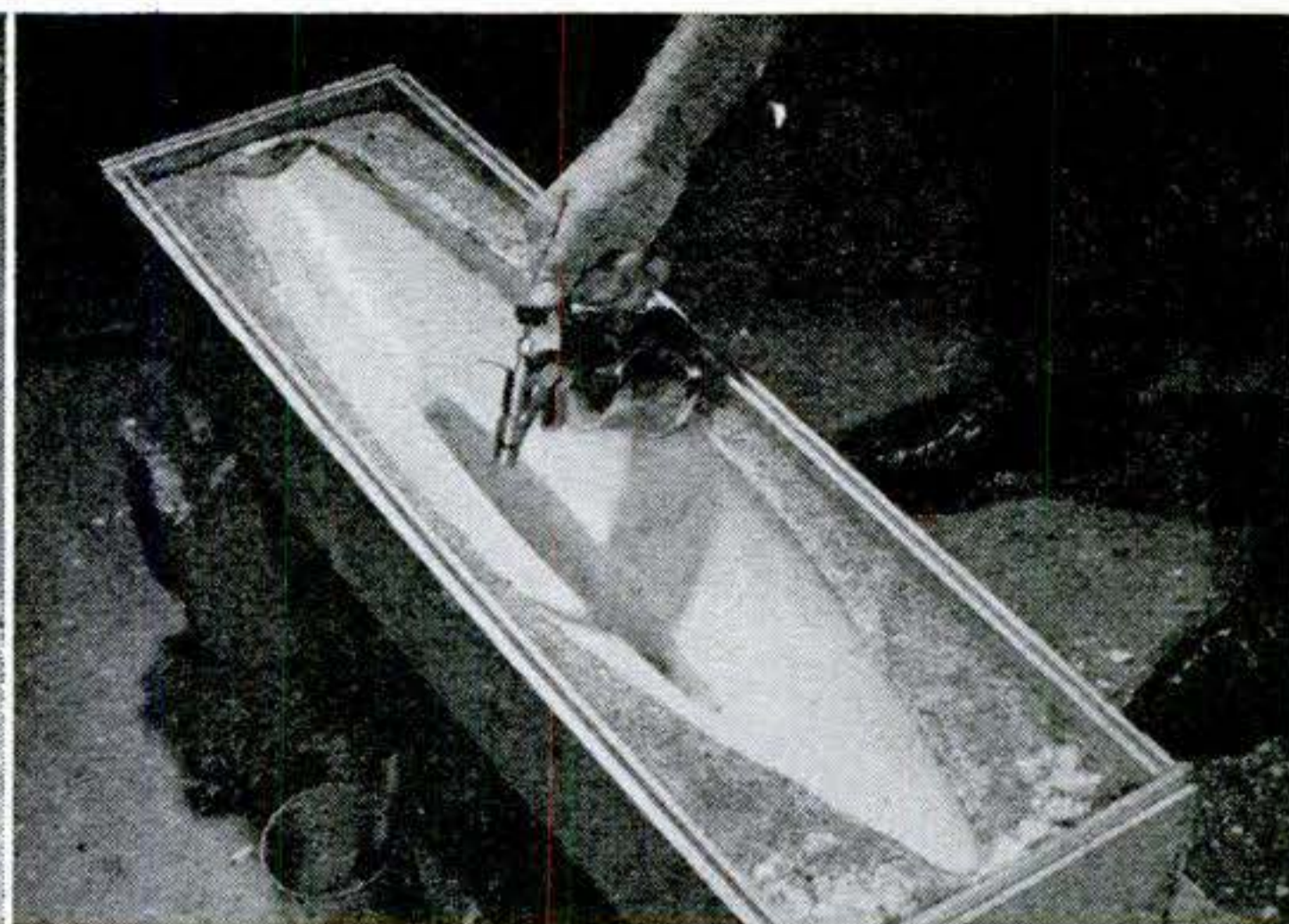
**4 PAPER**, in 4" by 12" strips, is brushed with adhesive, pushed firmly into mold, brushed again. Succeeding strips are overlapped slightly. Go around hull 10 times, making it 10 strips thick. Build up corners, stress points.



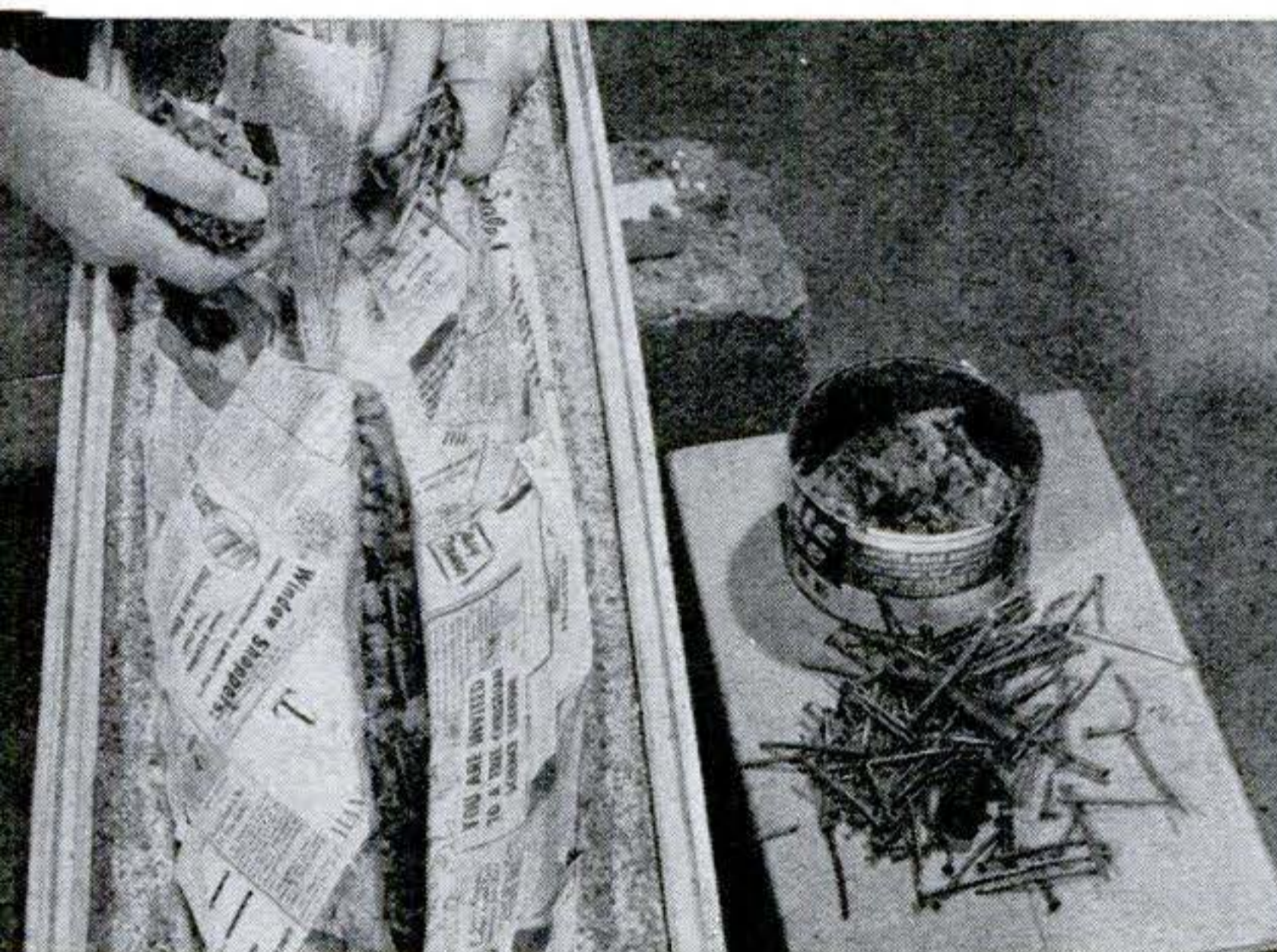
**7 AFTER HULL HAS DRIED** and been removed from mold, sides are trimmed to match original. Here deck line is found by comparing master and copy on same stand. Nail  $\frac{1}{2}$ " by  $\frac{1}{8}$ " gunwale strips along both edges.



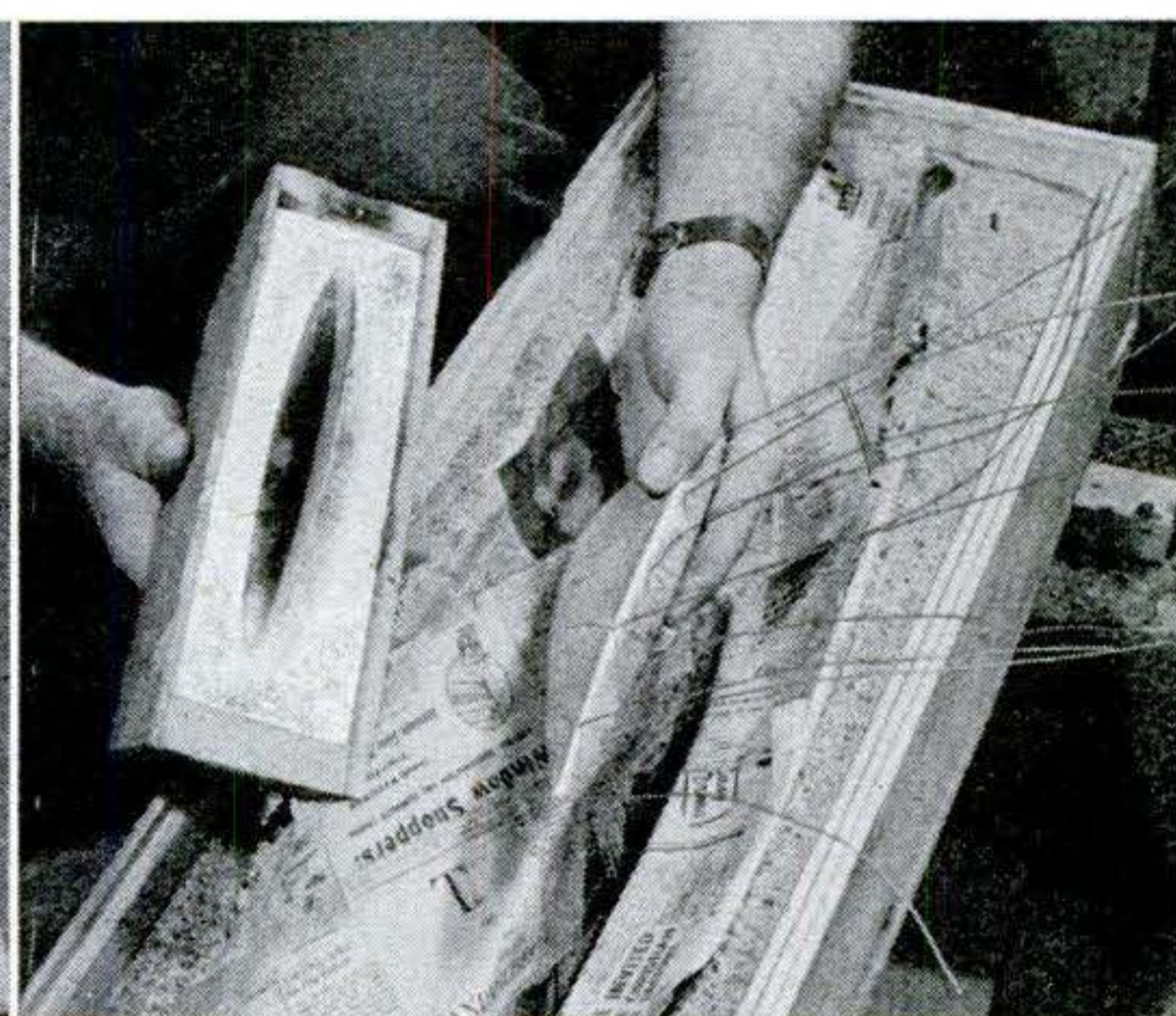
**2** PLASTER, with consistency of heavy cream, is poured over master almost to top of mold frame, built up around keel. Keel tip is left bare. Add two tablespoons vinegar per pound of plaster to slow hardening.



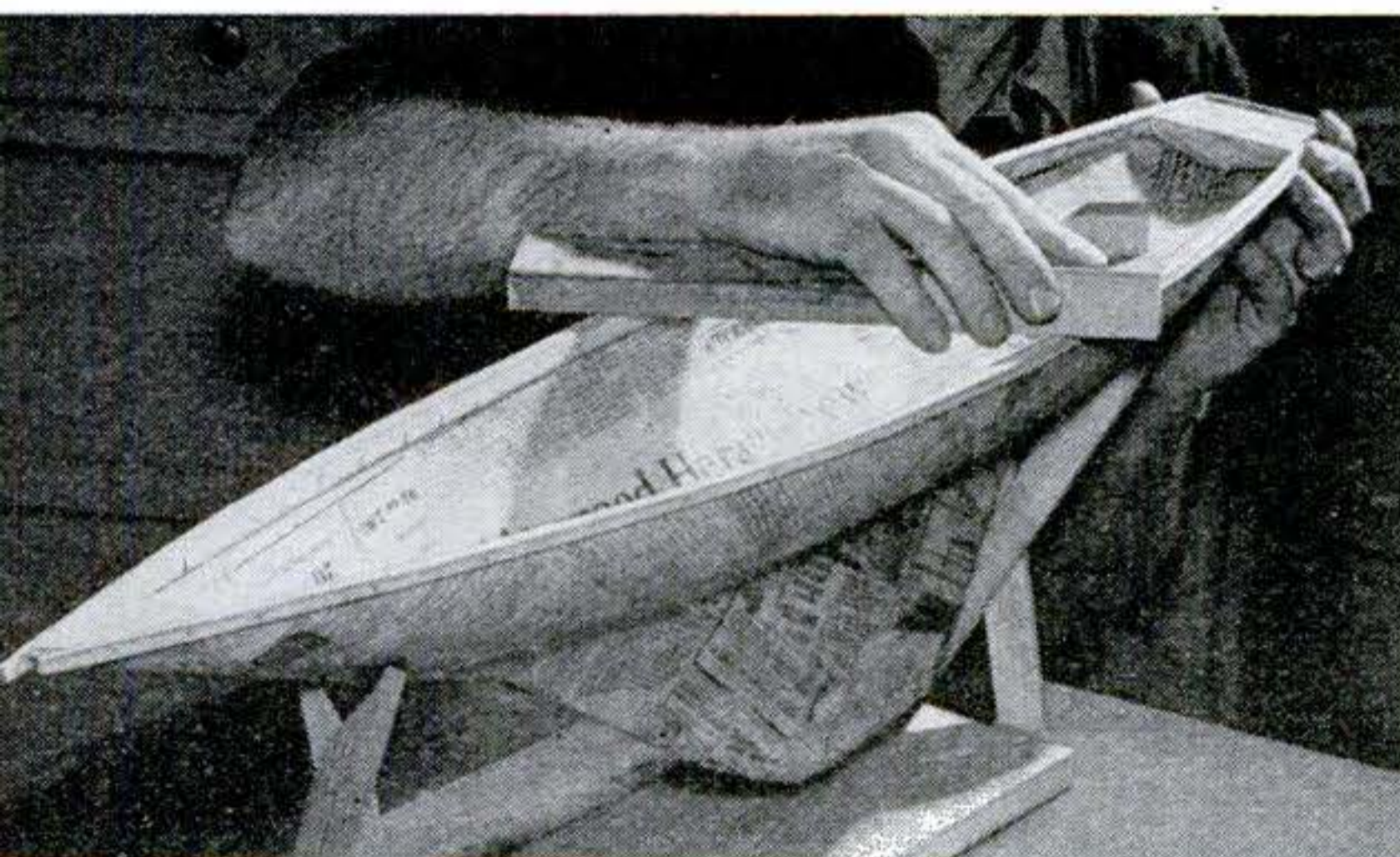
**3** AFTER HULL HAS BEEN REMOVED, hardened plaster mold is waxed with melted paraffin to keep paper from sticking. Torch (above) smooths out brush marks. Inverted mold is blocked up to leave room for keel.



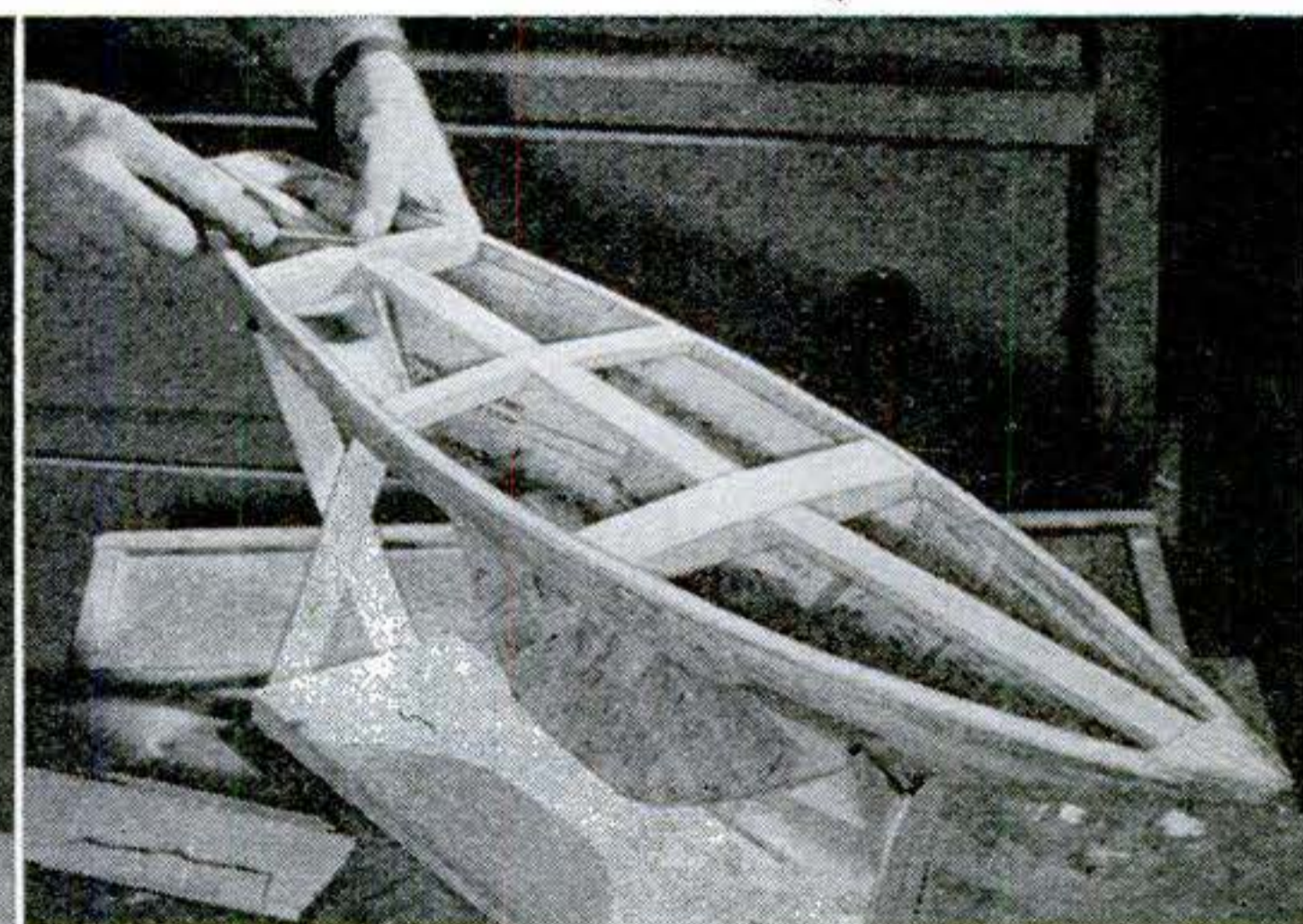
**5** KEEL is finished by filling open tip with paper strips, hand-forming to shape. Now fill hollow keel section with nails and scrap metal, and pack in papier-mâché wads, made by boiling paper, to make solid mass.



**6** ALTERNATE WAY TO FINISH KEEL is to fill hollow section with lead cast in desired shape in a mold. Wires embedded in metal are run up the sides of the hull when half finished, then covered with rest of paper.



**8** EDGE OF HULL above strips is sanded off, using long block. Now fit pieces of 3/16" wood into bow and stern. Insert cross braces where mast and rudder shaft come; another goes halfway between. Nail from outside.



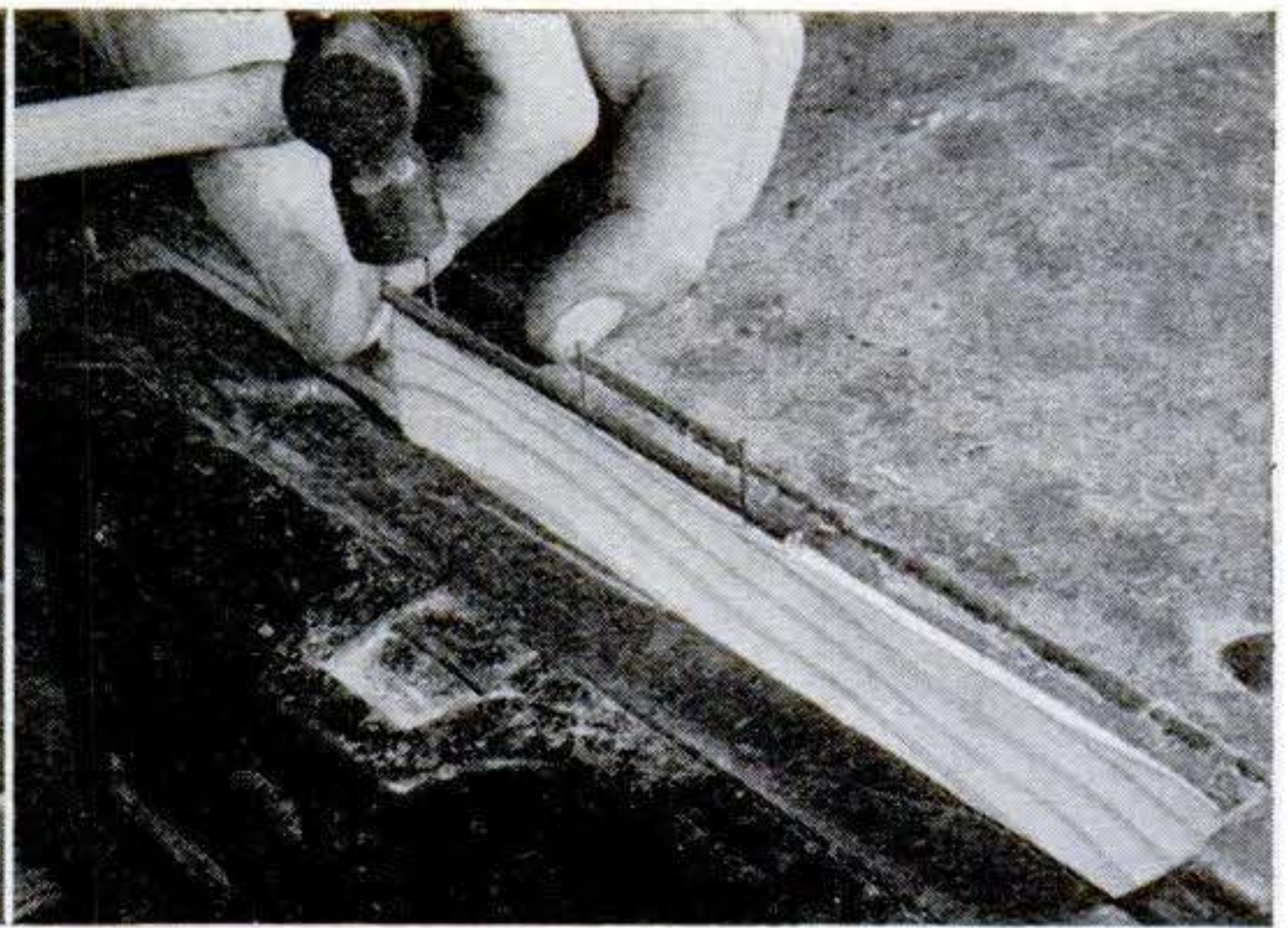
**9** TRIM THE ENDS of the 1/2"-thick cross braces so they are bowed to match camber of deck, found by making a template of the original. Drill after cross brace to receive tube for rudder shaft. Fit in lengthwise braces.

Please turn the page for more boat photos.

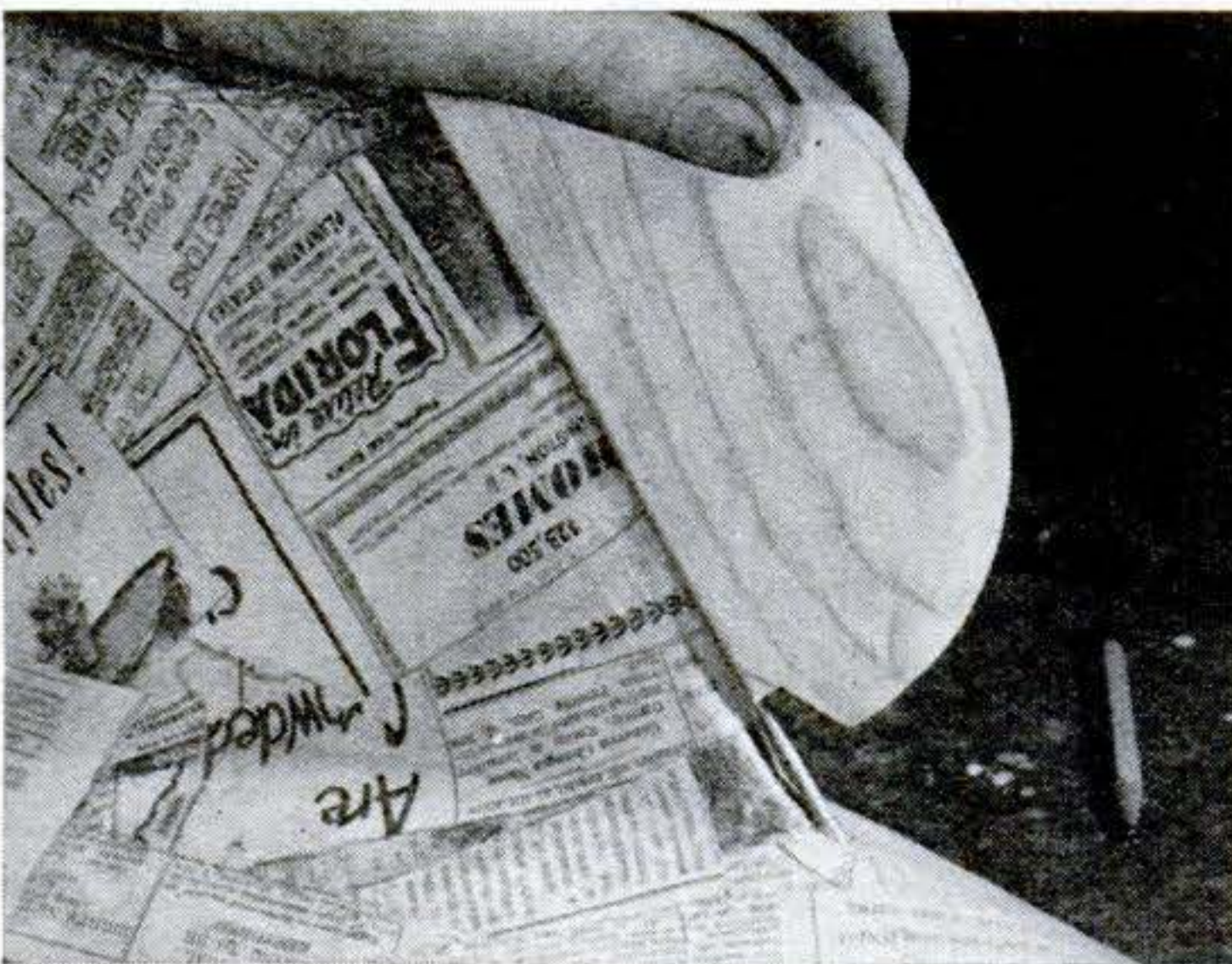
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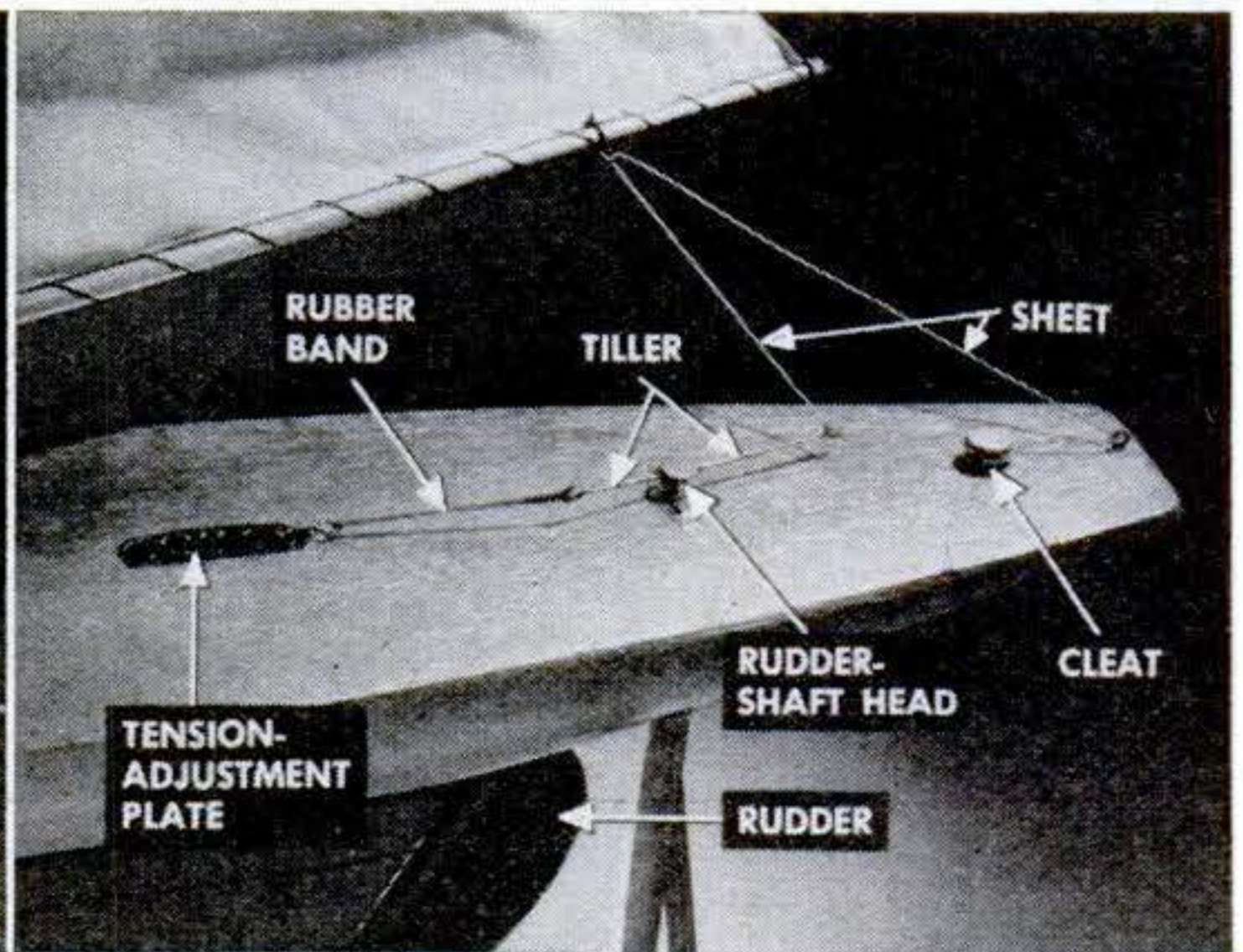
**10 DECK GOES ON** after rudder-shaft tube is run from keel to cross brace. Set it so rudder will fit along after edge of keel, parallel to it. Three-layer paper deck is pulled taut over hull, glued, pinned to dry.



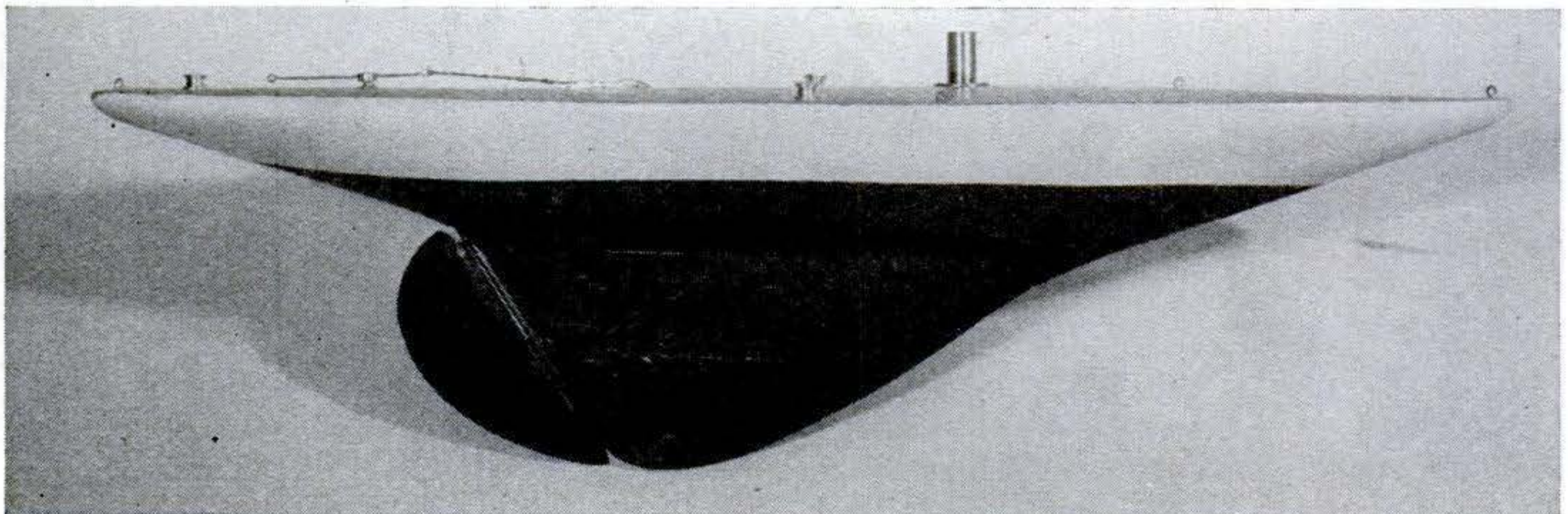
**11 RUDDER**, somewhat overscale to improve control, is carved to shape. Make a V groove in forward edge to hold the rudder shaft—brass rod, slightly smaller than tube, drilled for the brads that fasten it to rudder.



**12 RUDDER SHAFT** is slid into tube that carries it to deck. Note how rudder is notched to clear hull. Shaft is topped with brass cap made from  $\frac{1}{2}$ " rod, drilled at an angle so it is vertical to deck when rudder parallels keel. Wire tiller, soldered into cap, projects both fore and aft. Adjustment plate (next picture) can be bent from sheet brass.



**13 INGENUOUS TILLER RIG** keeps sloop on course in squally weather. Sheet runs from stern to pulley on main boom, then via screw eye to after end of tiller. When gust pushes mainsail, tending to point bow into wind, sheet pulls the rudder over so it steers boat off wind to compensate. Spring keeps tiller from going too far, brings it back.



**14 FINISHED HULL** shows water line in contrasting paint. Line is found by floating hull in tub of water sprinkled with sawdust: a sawdust ring is left on hull when you take

it out. The mast should be stepped temporarily when doing this because it alters trim of boat. I used a brass socket to mount mast in order to keep the paper deck tight.

# I Made This Motor from a Poker Chip

**Here's where one chip gives you a run for your money. This flea-power motor won't drive anything—but it's fun.**

**N**EXT time you have an hour or two that nobody else wants, try building this midget magnetic motor. It will cost you nothing to make, and when you get through it will look like it, too. Watching it go around (which is all it *will* do) may amuse you—at no expense. This is much cheaper than poker-chip fun usually comes.

All parts should be scrounged. If you can't do as I did (see list below), invert any small boy until his pockets are empty.

**The magnet.** Bend the nail  $\frac{3}{4}$ " from the head, cement on cardboard disks cut around a penny, and wind on wire of any size from No. 22 to No. 30. I spread cement on the next-to-last layer and wound the final layer neatly to hide what I had done up to then.

**The armature.** This is the legal name for your reformed poker chip. Drill a  $\frac{1}{4}$ " hole in the center of it, which you can find by running a compass around it or by cutting a paper disk the same size and folding it evenly two ways.

Cement the 1" length of dowel into the chip, as square as squinting will make it. Then scratch two lengthwise grooves in the dowel opposite each other. Cut two pins in half and cement the head ends into the grooves so that the shanks stick up above the dowel just a hair. Scrape off excess cement, because current must get through.

With pliers, shove the other pin halves



into the ends of the dowel, points out. Try for the center, to avoid wobble.

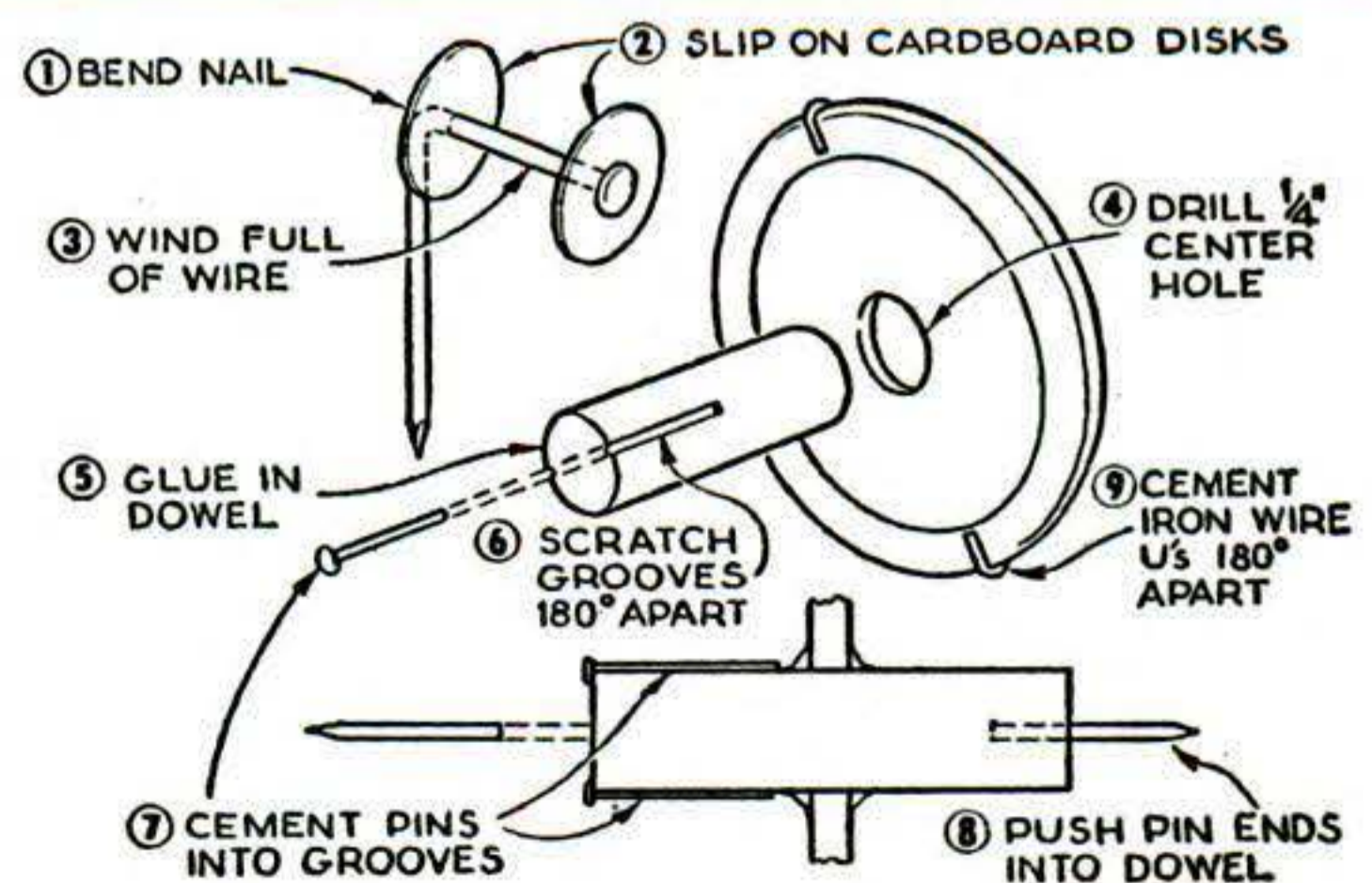
Bend two  $\frac{1}{2}$ " bits of iron wire into Us and squeeze them over the edge of the poker chip on opposite sides, a quarter of the way around from the contact pins.

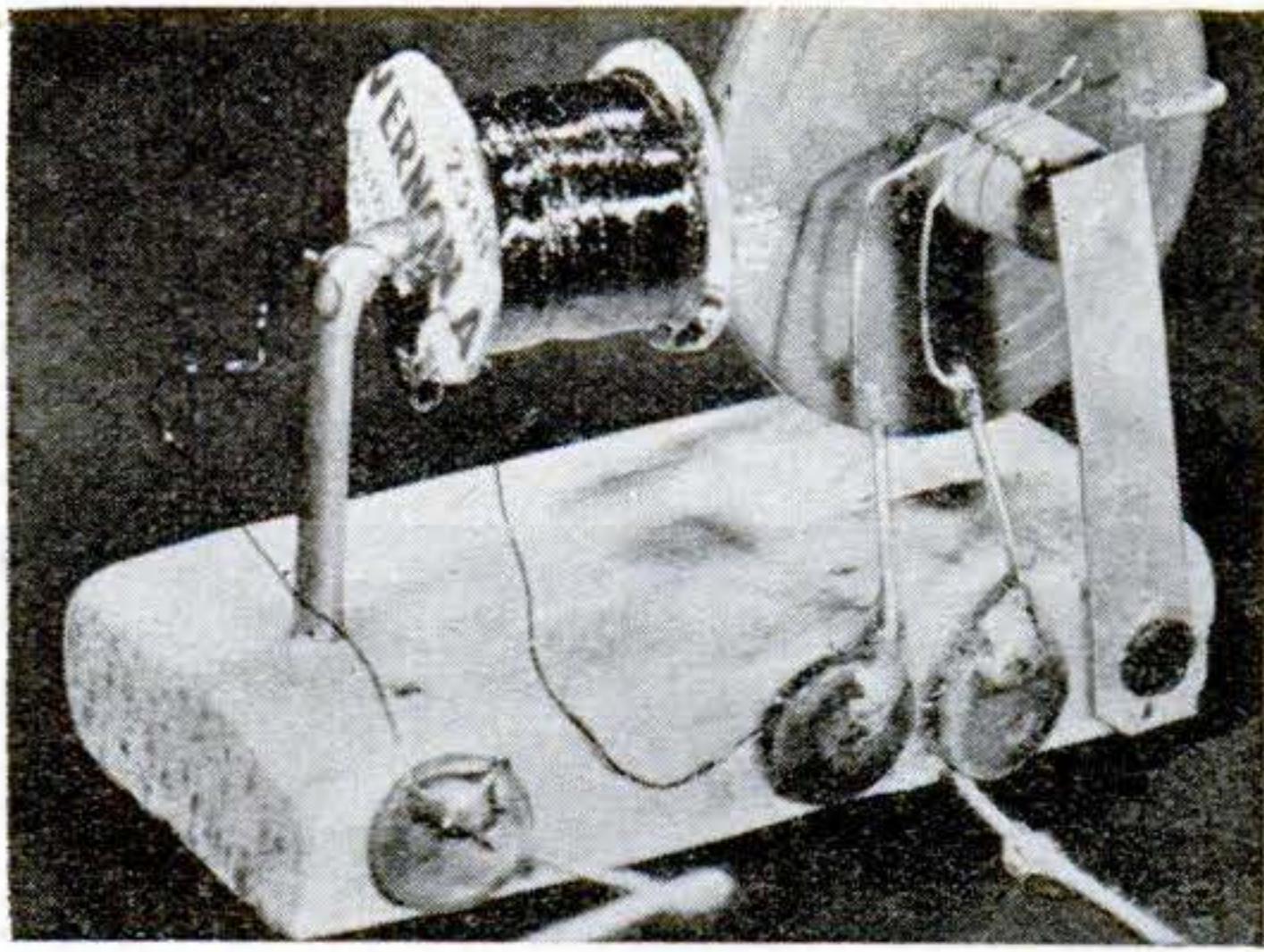
**Bearings.** Dimple two tin strips with a nail. Tack the strips to the base so the armature will spin in the dimples. Unless it turns at the touch of a gnat's wing, it probably won't run.

**Brushes.** These must touch one contact pin in the split second that one iron U is rolling up to the magnet. The magnet gives

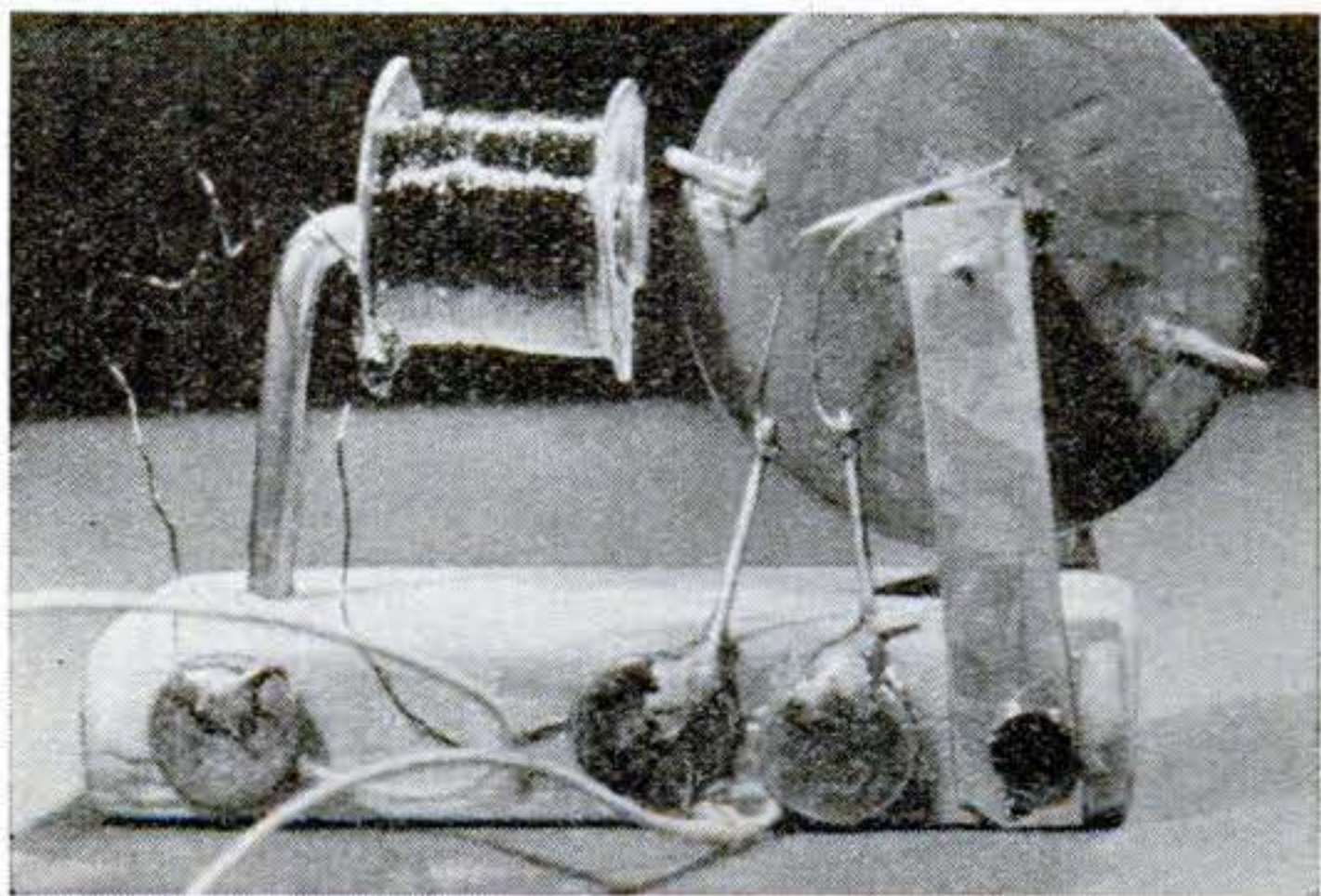
## No-Cost Parts List

- One  $2\frac{1}{2}$ " nail (pulled out after it caught my pants)
- One piece wood  $\frac{3}{8}$ " by  $1\frac{1}{4}$ " by  $2\frac{1}{2}$ " (sawed off a fence)
- Three thumbtacks (borrowed from office)
- One paper clip (ditto)
- Two  $\frac{1}{4}$ " by  $1\frac{1}{2}$ " strips tin plate (soup can)
- Two carpet tacks (pried out of carpet)
- Two  $\frac{1}{2}$ " lengths thick iron wire (found in pants cuff)
- One  $\frac{1}{4}$ " by 1" piece of dowel (broken toy arrow)
- Two  $\frac{3}{4}$ " cardboard disks (match folder)
- Two drops solder (already on iron)
- 25' No. 28 wire (defunct door bell)
- Tube model-airplane cement (kid wants it back)
- Two pins (wife)
- Three stale dry cells (flashlight needed new ones)
- One poker chip (source unnamed for security reasons)





**ADJUST THE BRUSHES** to barely touch dowel, but to make light contact with the pins glued along it. Mount the armature with wire Us grazing the magnet but not touching.



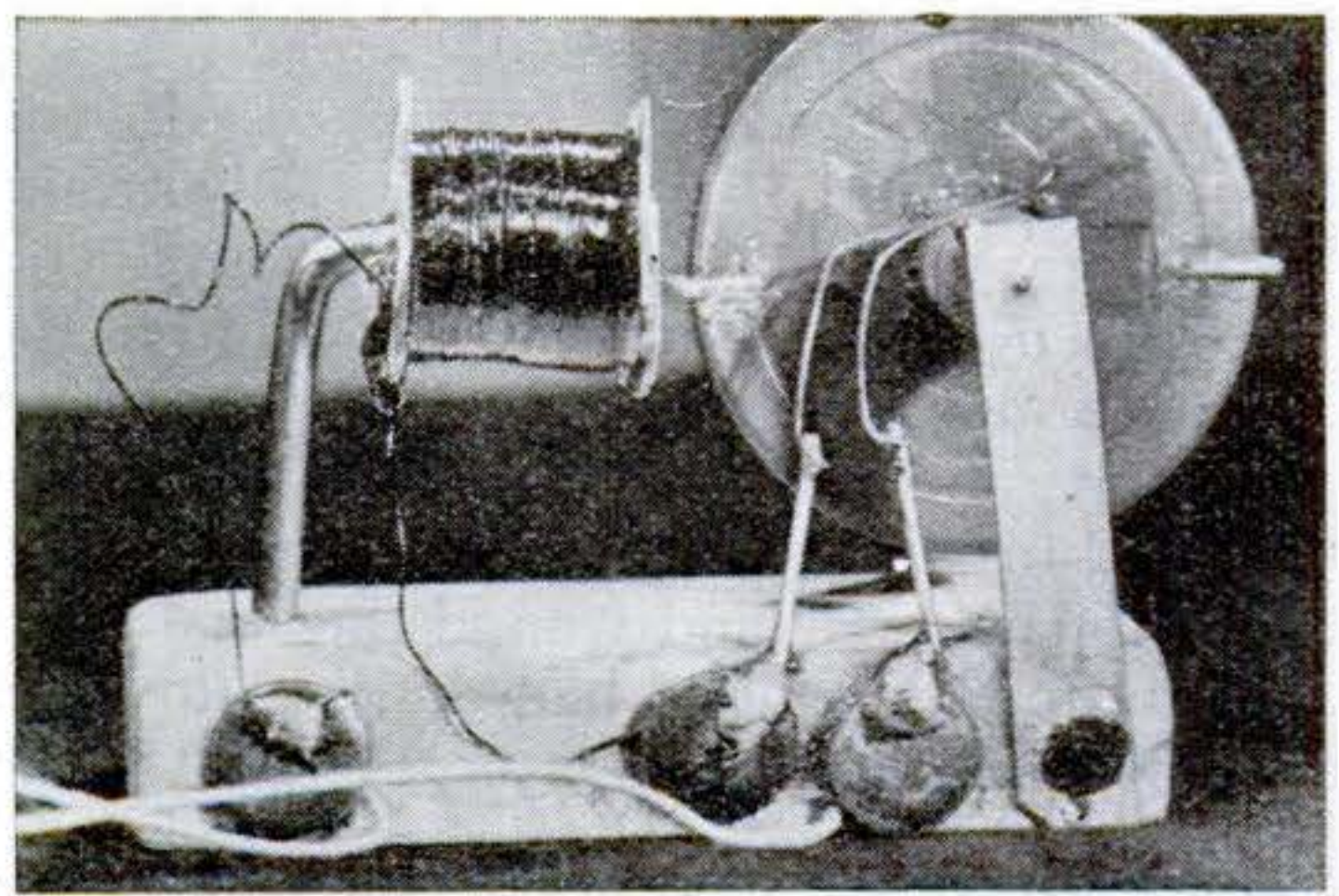
**CONTACT!** When iron U is a fraction of an inch from nailhead, as here, brushes should begin to touch one of shaft pins. If U is farther away, magnetic pull won't be effective.

a yank, the armature spins and the contact pin slips off the brushes till next time.

Jam two thumbtacks into the edge of the base, not touching, and solder on bits of paper clip. To these solder whiskers of thin bare wire, bent to skim the contact pins.

Run one end of the winding to a third tack (to which a battery lead goes) and the other end to one brush. Run the second battery lead to the other brush. Use two or three flashlight cells in series (head to tail).

Given a twist, the motor should run but probably won't. Bend the whiskers until the timing is right. My poker chip spins at about 2,000 r.p.m. Until yours is going, no other poker chip can equal that record.—*Clarence Leino, West Allis, Wis.*



**BREAK.** When the U is squarely opposite the magnet, as above, brushes must break contact with the shaft pin. If they don't, magnet will "hang on" and the motor won't run.

## AUTOMATIC TOASTER

*If it will not heat up*, there is an open circuit in the toaster, the cord or the plug. First check the wall outlet itself to make sure the open is not in the house circuit. The open could be in the toaster terminal connections, the switch contact points, or the heating elements. Caution: Do not check the toaster while it is plugged in!

*If the toast is too brown or not brown enough*, the toast color adjustment is not correctly set. With exceptionally dry or damp bread, the regular color knob may not give enough adjustment. The secondary adjuster knob or wheel must be turned. The secondary adjustment is usually located at the bottom of the toaster, under the crumb tray. The adjustment is correct when medium toast is obtained with the regu-

lar adjusting knob turned to its mid-point.

*If the toast is not uniform*, so that later slices are lighter or darker than earlier slices, the thermostatic or timing control is not operating properly. Jammed parts or a worn or dirty timer may be at fault.

*If the toast will not pop up*, the pop-up lever or knob may be out of adjustment. The carriage-elevator spring may be broken, or the mechanism that releases the hold-down catch may be jammed. The dash-pot piston may be binding, or the contact points in the switch may be fused (from using an AC toaster on direct current). If the thermostatic or timing control is inoperative, the carriage will not pop up. (From *Electrical Appliance Servicing*, by William H. Crouse.)

FOR YOUR POPULAR SCIENCE MONTHLY INFORMATION FILE

# How to Build an Electric Hedge Trimmer

Don't take off too much on the sides when you try out this power clipper. A fan motor zips it through the shrubbery.

By John Rogers

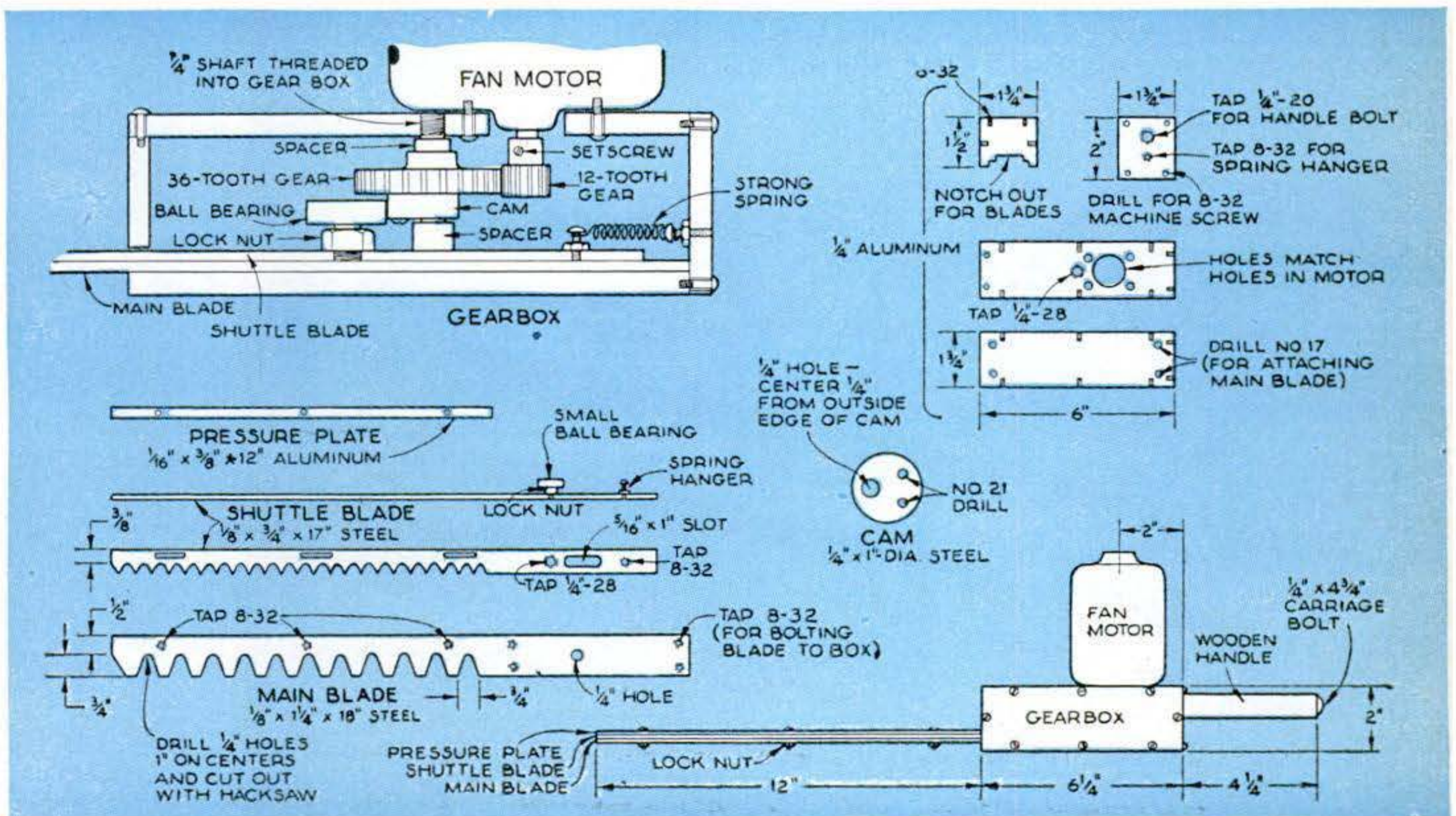


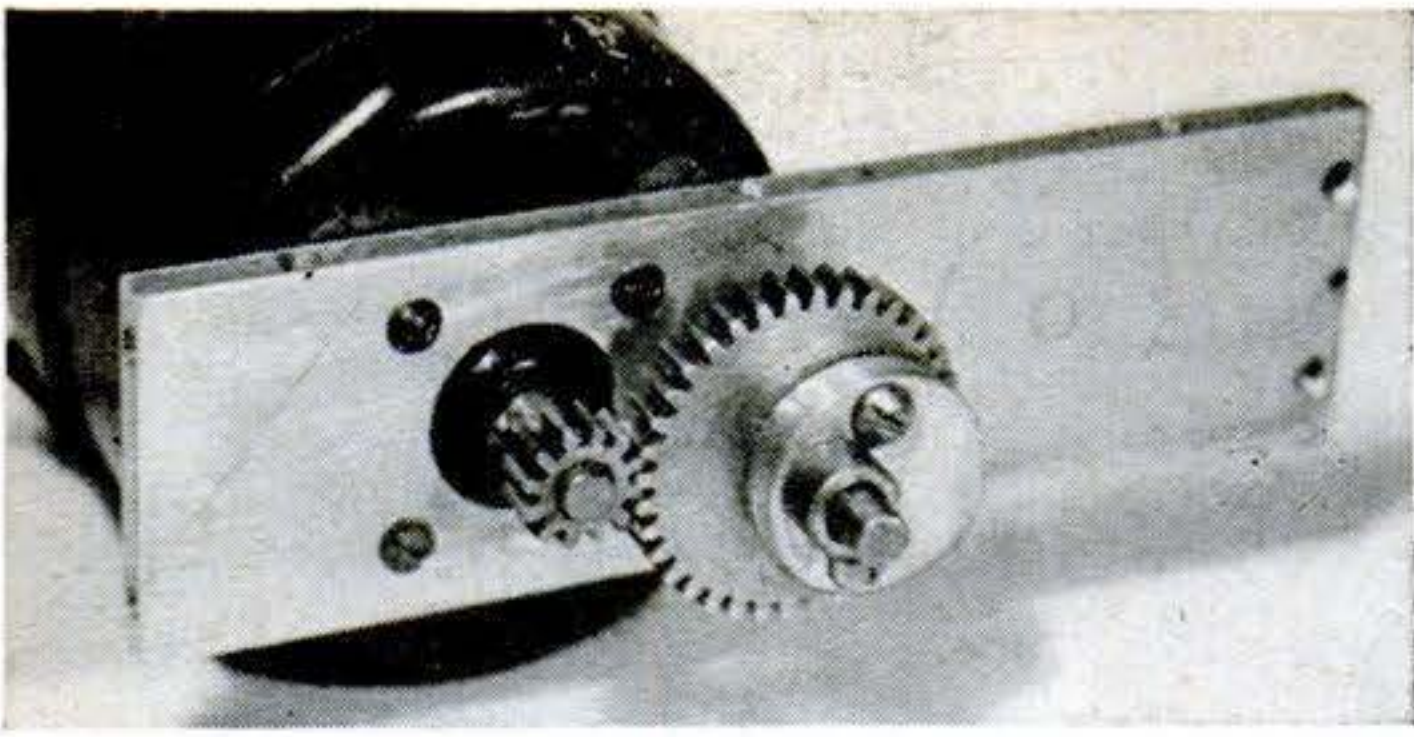
WHEN you do it by hand, clipping the hedge is one of those chores that is always naggingly ahead of you. But with this electric trimmer, you can hardly wait for the stuff to grow to have the fun of clipping it again.

My trimmer was made from an old fan motor and a few bucks' worth of metal and parts. It has a simple mechanism that can be built without a lathe. A drill press is a help but isn't really necessary.

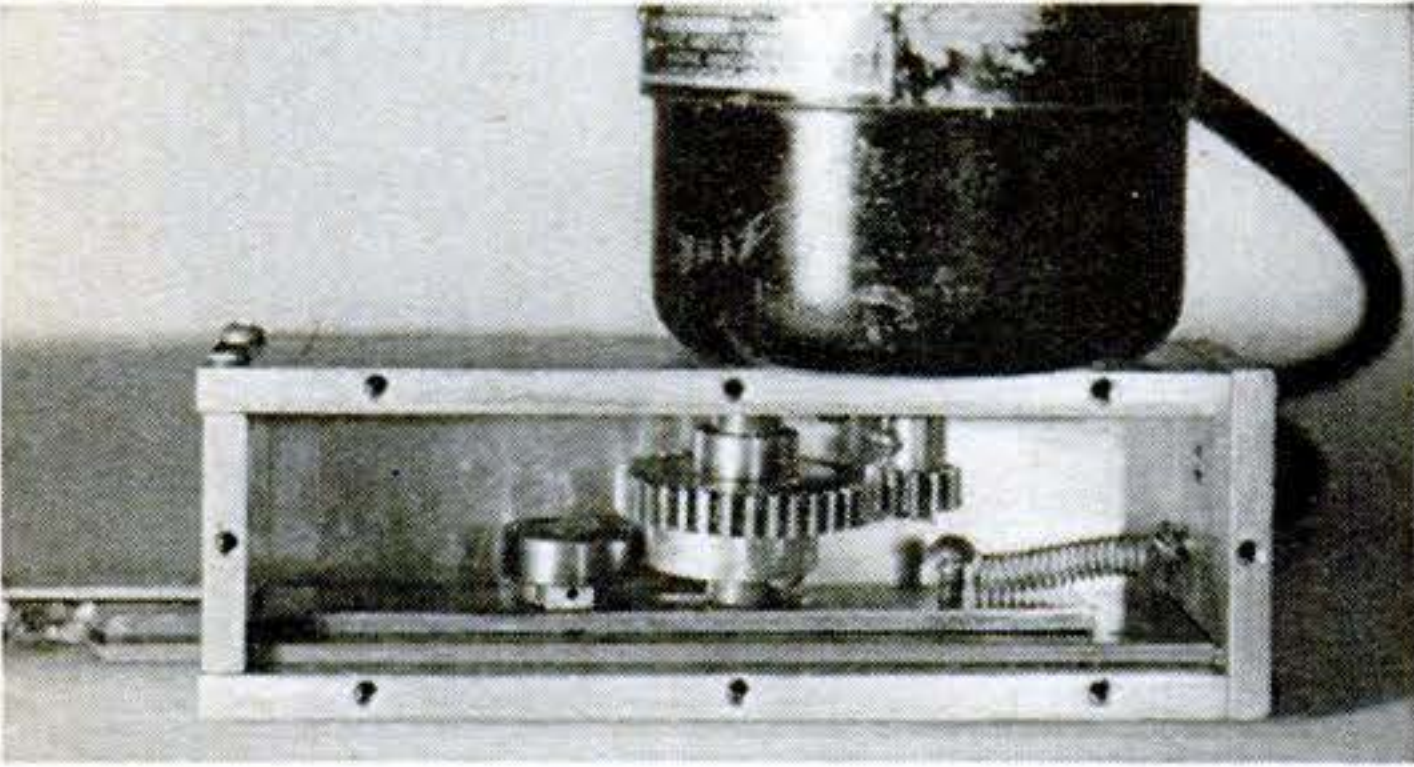
**Motor.** Mine is a 100-watt AC-DC universal motor. Very light-duty, AC-only fan motors are not recommended for this job; neither are the overly husky AC-DC ones used in vacuum cleaners. A motor from a 10" fan or a little hand vacuum will do.

Geared down 3 to 1, the motor drives a

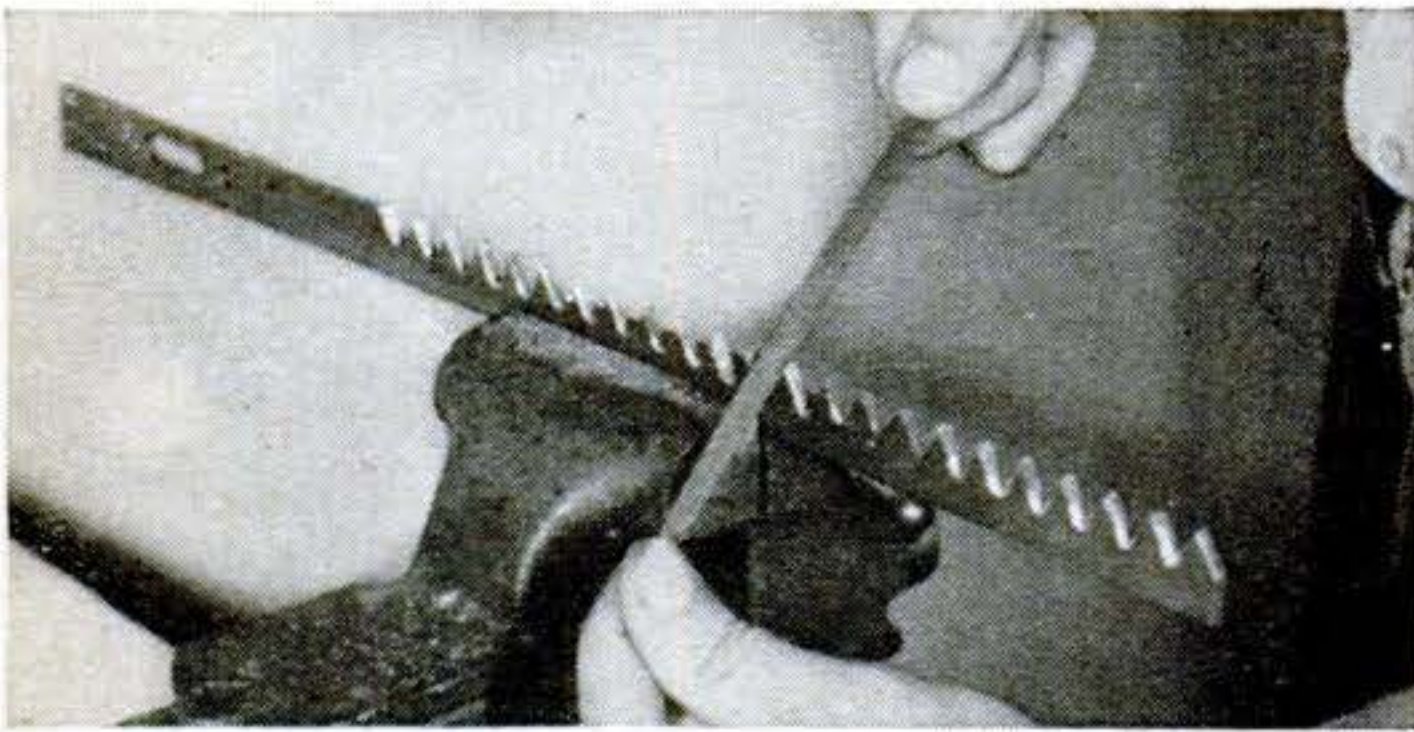




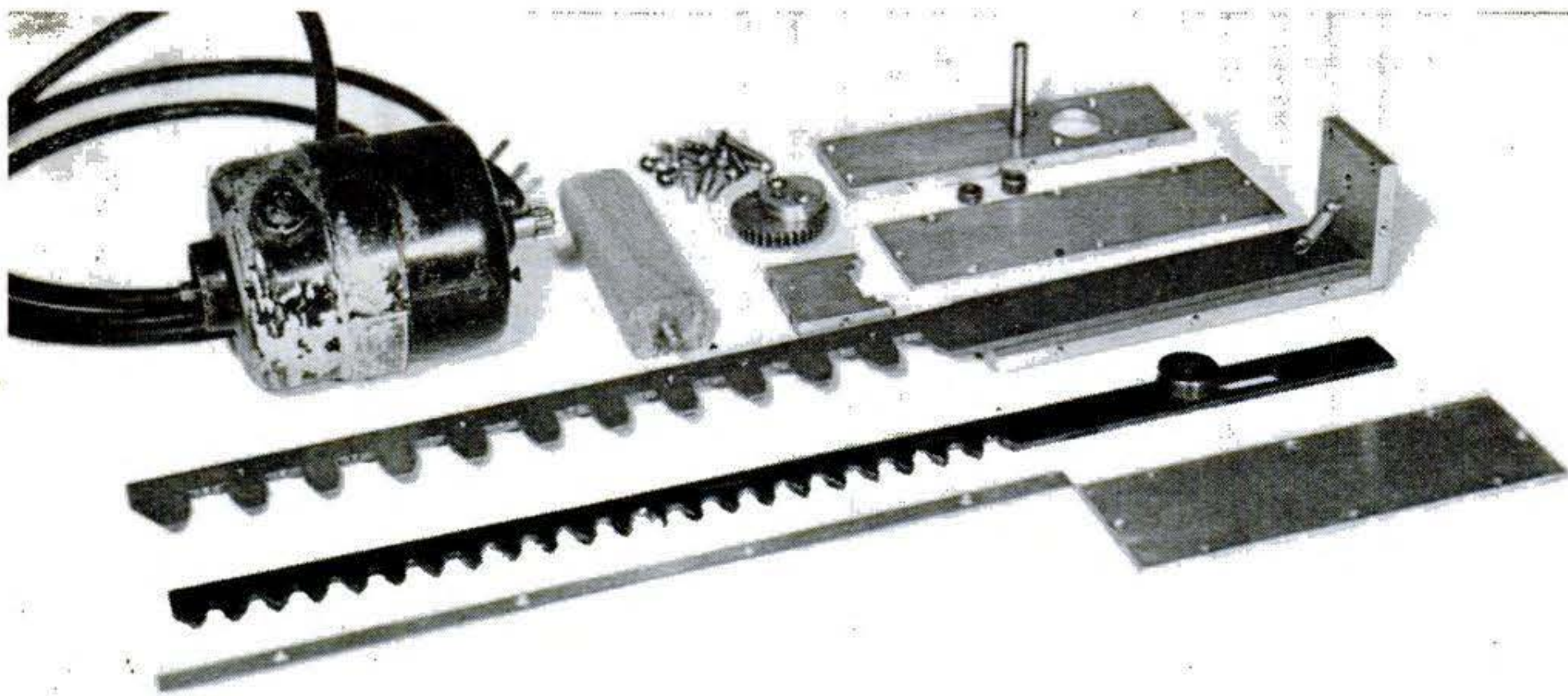
**SPUR GEARS** reduce speed of cam below that of motor shaft. Large gear spins on stationary shaft. Spacer collars keep it in mesh.



**OPENED GEARBOX** shows parts in operating position. Cleaned here for visibility, parts inside should be well greased before use.



**SHARPEN TEETH** with a triangular file, beveling back from edge nearest other blade. Tooth points need not be sharpened dangerously.



**TAKEN APART**, trimmer shows its simplicity. Cutter teeth aren't hard to form with drill-

cam having a  $\frac{1}{2}$ " lift. A small ball bearing that rides this cam is attached to a notched steel blade, sliding it back and forth beside a stationary notched blade. Hedge twigs combed by these blades are sheared off as clean as a whistle.

**Gearbox.** This is sawed and filed from aluminum plate,  $\frac{1}{8}$ " for the sides, and  $\frac{1}{4}$ " for the top, bottom, front and back. It is held together with 8-32 machine screws. (You'll be using a lot of these screws, which call for a No. 29 tap drill. A No. 21 drill makes a snug clearance hole and a No. 17 drill a comfortably loose one.)

In the top piece I bored a 1" hole to take part of the end bell of the motor. Near this I spotted four holes to match holes in the end bell originally used for mounting the fan-blade guard. With the gearbox top bolted to the motor, I fitted the shaft with a 12-tooth spur gear (No. H2412 in the Boston Gear Works catalogue).

Along the centerline of the top, in front of the motor, I placed the larger gear, a 36-tooth one (Boston No. G261), moved it until the mesh was just right, and marked the top for the  $\frac{1}{4}$ " shaft. This shaft, a  $1\frac{3}{4}$ " length of drill rod, is threaded  $\frac{1}{4}$ "-28 and screwed into the top.

**Cam.** This is simply a 1" disk of  $\frac{1}{4}$ " steel, with a  $\frac{1}{4}$ " hole located  $\frac{1}{4}$ " off center. It is attached to the larger gear with a pair of 8-32 machine screws, run through snug (No. 21 drill) clearance holes in the cam.

**Main blade.** If you want hardened cutters, better make both blades from either ground flat stock or annealed auto-spring leaves. I used  $\frac{1}{8}$ " cold-rolled steel for simplicity, and it does fine.

saw-file method because blade stock is only  $\frac{1}{8}$ " thick. Note ball bearing on shuttle blade.

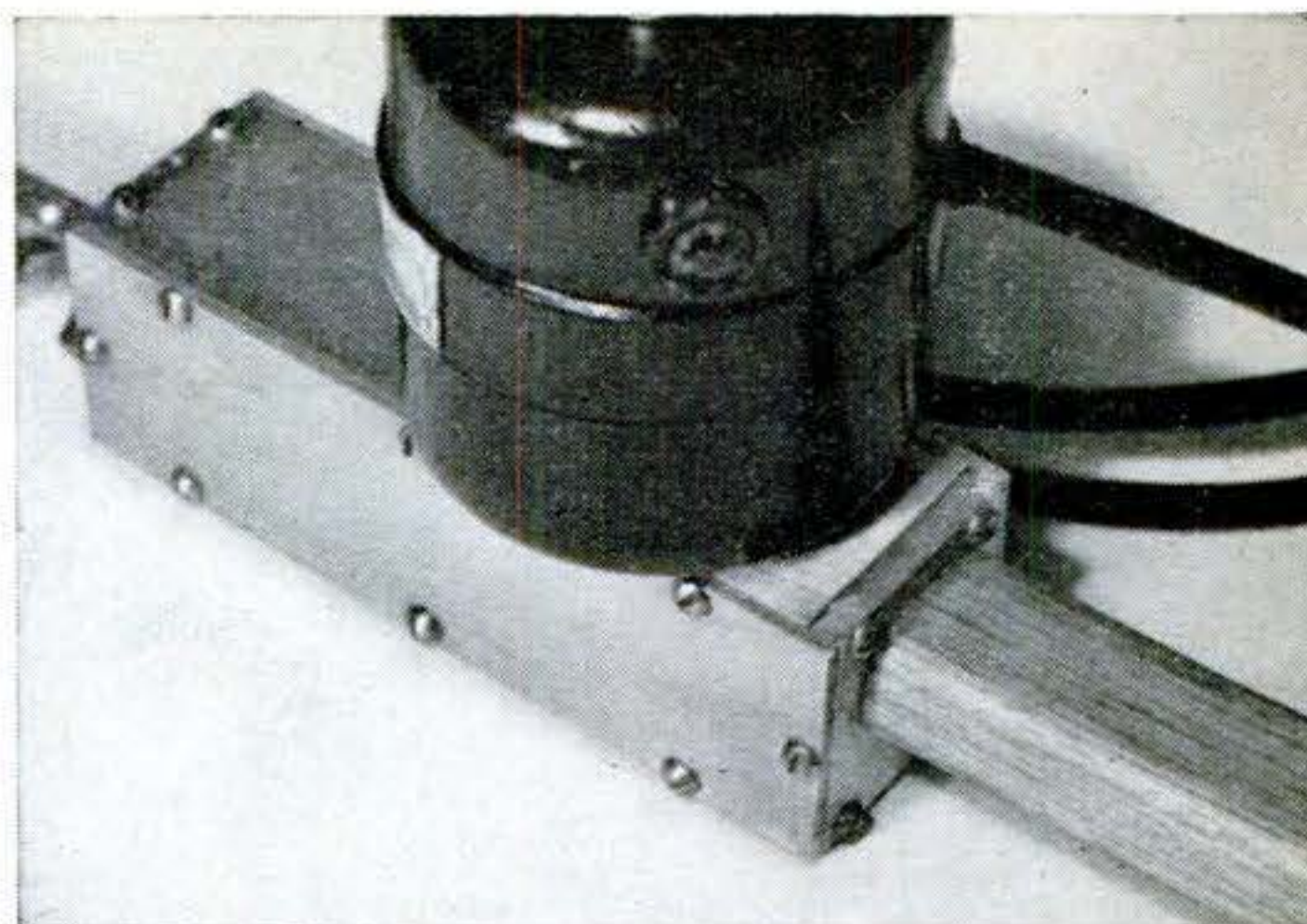


I cut the teeth in the main blade by drilling a  $\frac{1}{4}$ " hole at the root of each tooth, sawing out the unwanted section, and beveling the edges with a file. There are 11 of these teeth. Four 8-32 holes near the end of this blade secure it to the bottom of the gear-box, and a  $\frac{1}{4}$ " hole takes the end of the shaft.

**Shuttle blade.** This is a bit fussier, since it has 22 teeth, three slots and a stud for the ball bearing. I cut the teeth in the same manner, beveling them so the sharp edges of both blades would adjoin. The slots, needed in the shuttle blade so it will clear the gear shaft and the pressure-plate bolts, were formed by drilling a series of holes. Then I used a sharp cold chisel to clean out the remaining webs and filed them smooth.

Forward of the bigger slot I drilled a hole and tapped it  $\frac{1}{4}$ "-28 for the  $\frac{1}{4}$ " stub shaft, secured by a lock nut, that holds the ball bearing. This bearing has a  $\frac{1}{4}$ " inner race and is about  $\frac{3}{4}$ " in outside diameter. The inner race is soldered to the stud.

**Finishing up.** The front of the gearbox should be notched to clear the two blades, and the back tapped for the handle bolt and the spring hanger. The handle is a  $\frac{3}{4}$ " by 1" by  $4\frac{1}{4}$ " piece of wood, held on by a through carriage bolt.



**HANDLE** secured to end of gear box was smoothed but left mainly rectangular for firm grip. A feed-through cord switch controls the motor.

A strip of  $1/16$ " aluminum acts as the pressure plate. Pulled snug by three screws, it draws the two blades together, and should be adjusted until the blades are in close contact but are still free to move. Then lock nuts are tightened on the screws.

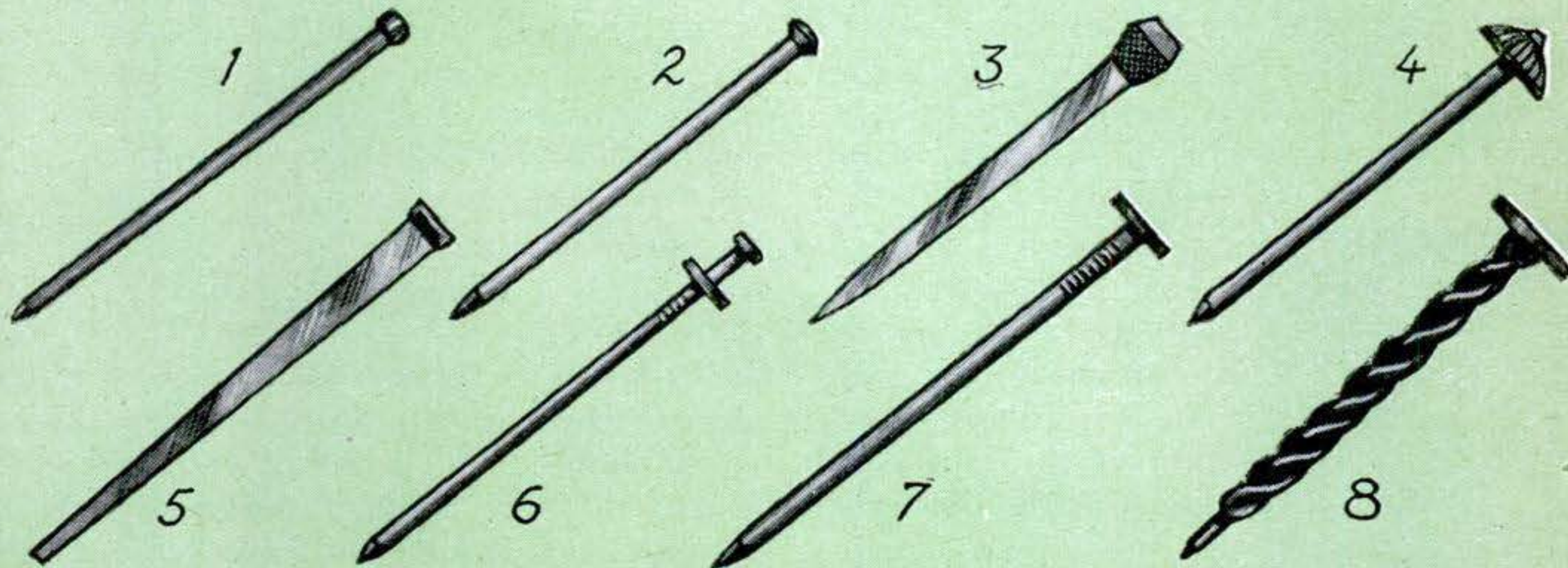
The spring that holds the shuttle-blade bearing against the cam should be quite strong. Otherwise the bearing will tend to float off the cam at high speed, causing excessive vibration. If the bearing does not remain in contact with the cam, use a stronger spring or a double one. **END**



## NAIL-BOX QUIZ

Dig into the cigar box and try to identify these nails. Invert the page to score yourself.

By C. B. Colby



1. Finishing nail; 2. boat nail; 3. horseshoe nail; 4. leakproof roofing nail; 5. cut nail; 6. double-headed nail; 7. common nail; 8. screw nail.

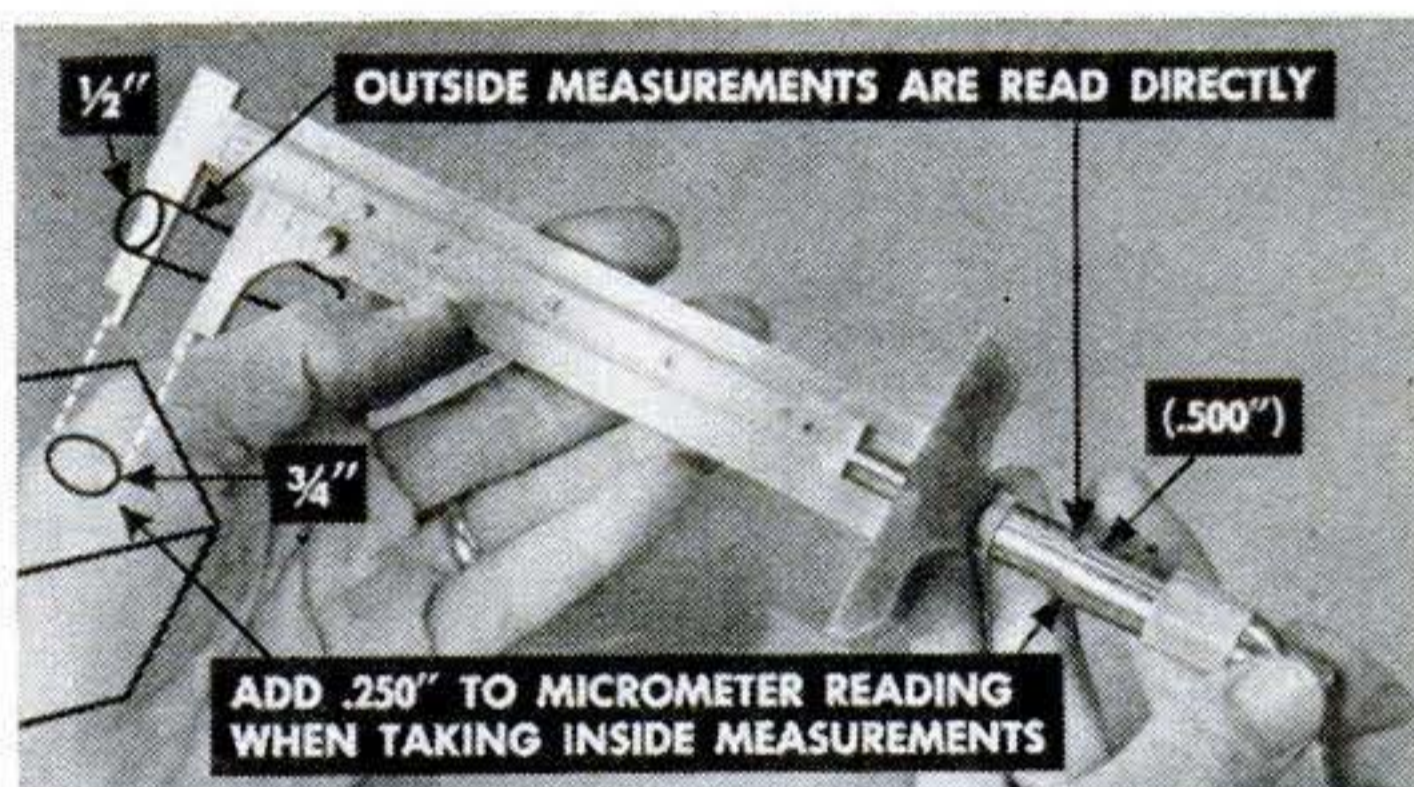


**Slide Caliper Made Precise.** When measuring those hard-to-get-at spots, use an inexpensive pocket slide caliper. It will reach into cavities and partly covered areas to bring out a dimension that a micrometer couldn't get. And it will give micrometer accuracy if you remodel it slightly.

Mike the jaw tips (left above) to be certain they are each ground to  $.125''$ . If they are oversize, hone them with a medium India stone, taking care not to taper them.

Clean the slide and the jaws thoroughly, so that they close perfectly, and lock them closed with the thumbscrew. Then file or hone the end of the caliper to bring the sliding scale exactly flush with the caliper body (right above). Check the end for absolute squareness.

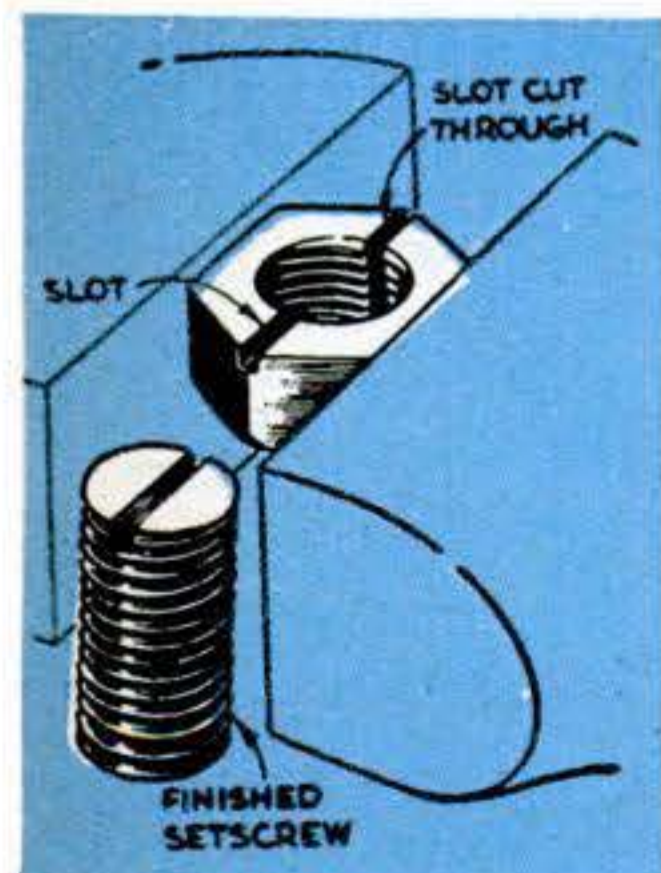
To use the caliper for measurements in thousandths of an inch, set the jaws on or in the work, "feeling" the setting, and lock the caliper with the thumbscrew. Then measure the separation between the caliper



end and the tip of the sliding scale with an  $0''$  to  $3''$  depth micrometer. Measuring a  $\frac{1}{2}''$  rod, as shown above, gives a direct reading of  $.500''$  on the micrometer. But a  $\frac{3}{4}''$  hole also reads  $.500''$  on the micrometer, so  $.250''$  is added to the reading to compensate for the thickness of the jaw tips, totaling  $.750''$ .

To *preset* the caliper to  $.750''$  for checking an inside dimension, *subtract*  $.250''$  (the jaw tips) and set the depth mike at  $.500''$ .  
—H. L. Truchelut, Atlanta.

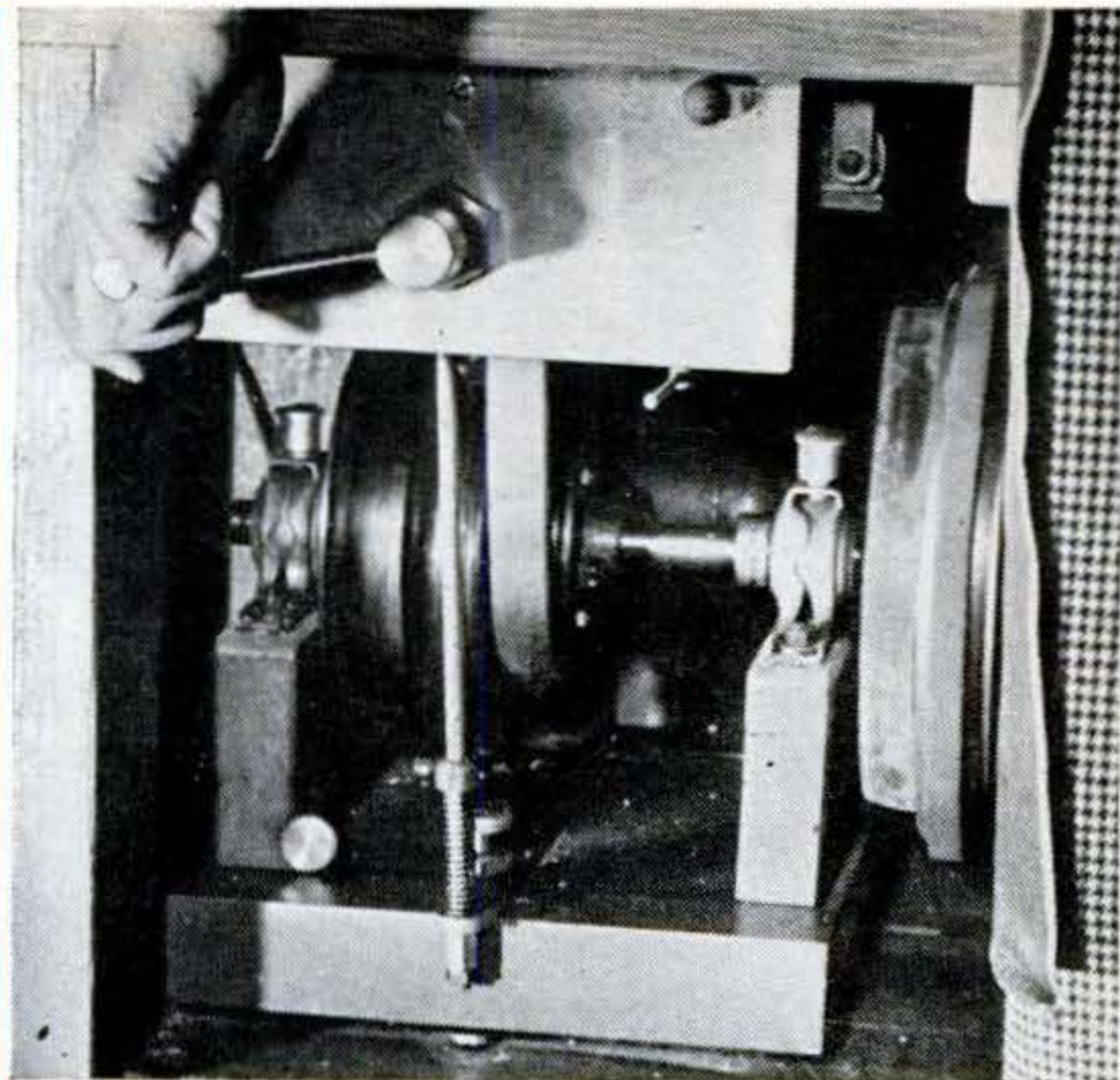
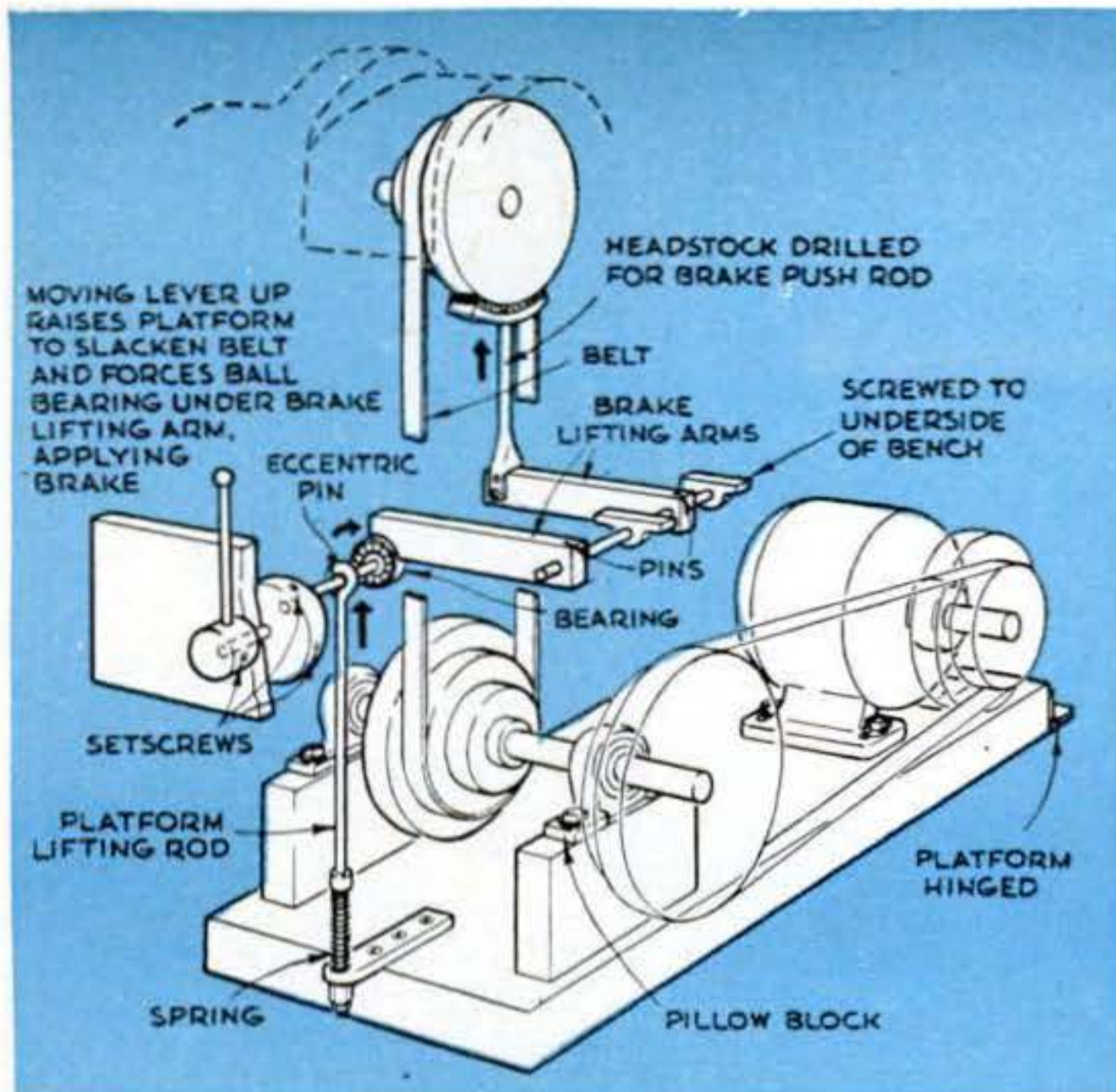
**Slotting Headless Setscrews.** When making setscrews from bolt ends or threaded rod, use a slotted nut to hold the work. The nut will grip and protect the threads while the slot will guide the hacksaw blade across the end.



Hacksaw a groove across the top of the nut and continue the cut down through one side to split it. Pressure of the vise jaws squeezes the nut tight on the threads, keeping the screw from turning—Hugh Lineback, Stillwater, Okla.

**Grease Gun Removes Broken Drills.** The high pressure generated by a grease gun can be very helpful when you have to remove a broken drill shank or centerdrill from a holding arbor. Drill and tap the arbor transversely into the base of its bore for a grease fitting. One stroke of the grease gun usually pops out the piece.

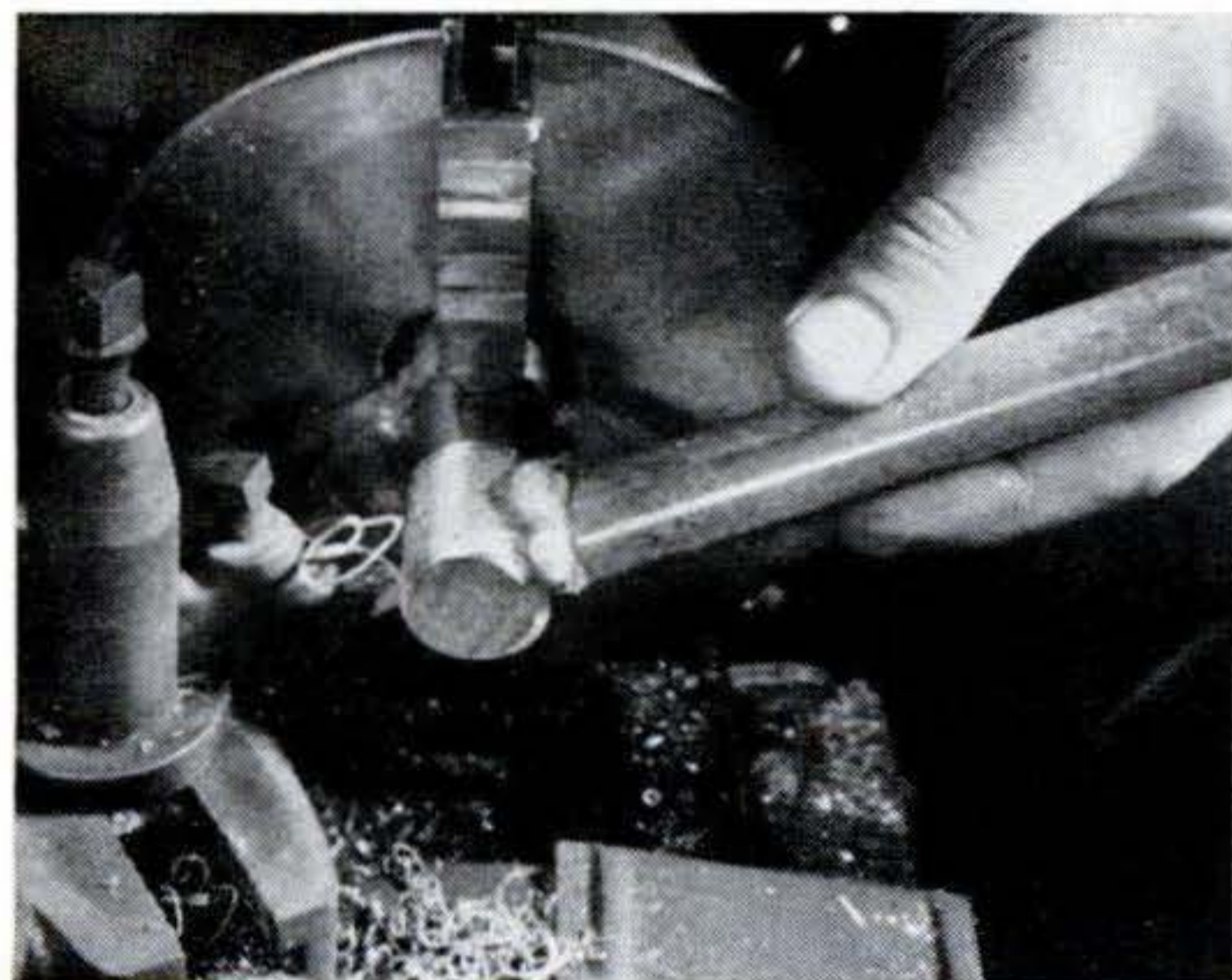
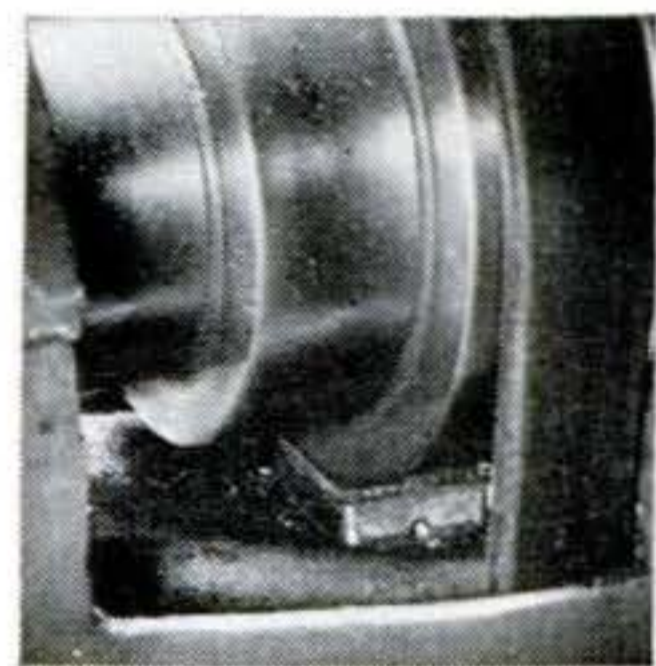
**Bolts Used as Screw Gauge.** In a pinch you can check the pitch of a screw thread by matching it with a bolt of known thread. Thread pitch on bolts is the same regardless of their diameter, so a workable gauge can be made up from a single set of bolts tagged or stamped according to their threads per inch.—George Berkwitz, New York City.



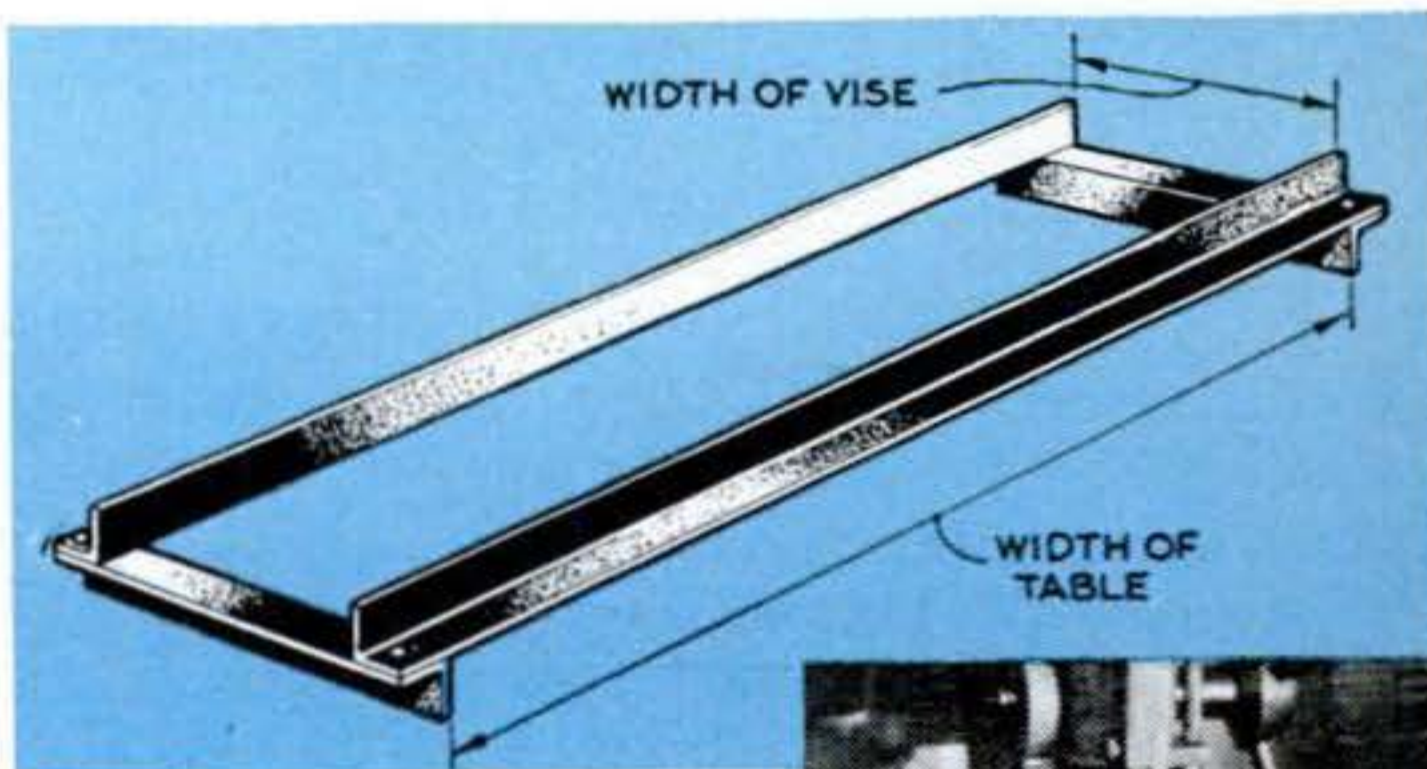
**Clutch and Brake for the Lathe.** This countershaft and brake-shoe setup installed below your lathe will give you convenient and instantaneous control of the headstock by providing positive braking action when the belt is slackened on the pulleys.

The motor and countershaft are mounted on a wood platform, which is raised by the eccentric action of the off-center pin fitted in a steel disk on the lever shaft. A ball bearing on the eccentric pin rolls into a matching radius on the front brake-lifting arm, causing the rear lifting arm to force

the cork-faced brake shoe (close-up at right) against the headstock pulley. The two lifting arms are an integral unit pinned to a  $\frac{1}{2}$ " shaft. As the eccentric pin passes top center, the platform weight holds it against the brake-lifting arm, locking both the brake against the pulley and the platform in the raised position.—*F. McGuckin, Ridgewood, N. J.*

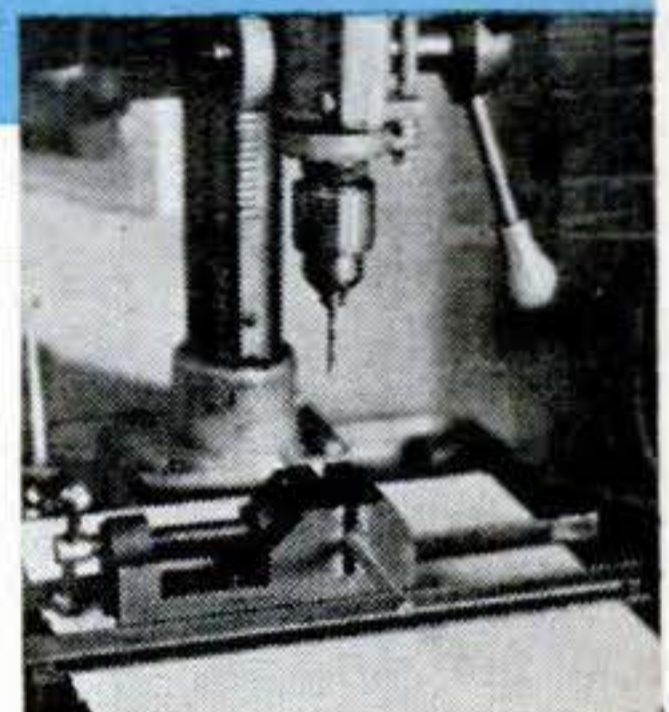


**Kerosene Applicator for Threading.** A plastic toothbrush holder or narrow olive jar can be filled with kerosene-soaked cheesecloth to aid in cutting clean threads in brass and aluminum. The cheesecloth protruding from the top of the holder is moved along behind the tool bit as it cuts, keeping the work moistened with kerosene but not dripping.



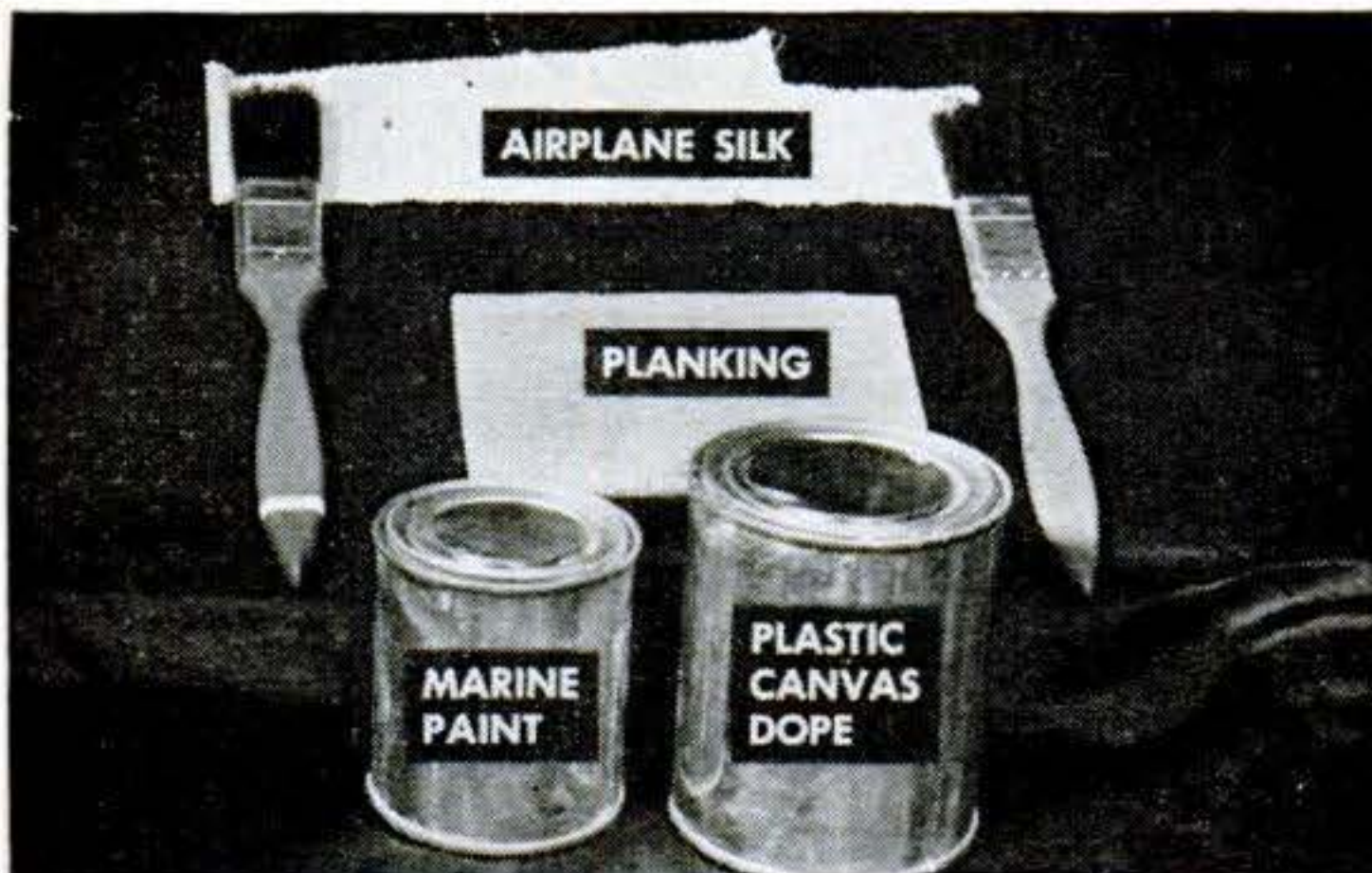
**Vise Cradle.** This support, made from four lengths of angle iron, will resist the efforts of the drill-press vise to turn under pressure of heavy drilling. No other clamps or hold-downs will be required.

Bolt the angles together to a close but not tight fit on the vise and the edges of the drill-press table, so the vise can be moved sideways or forward and back for positioning.—*J. Williamson, Watertown, N. Y.*

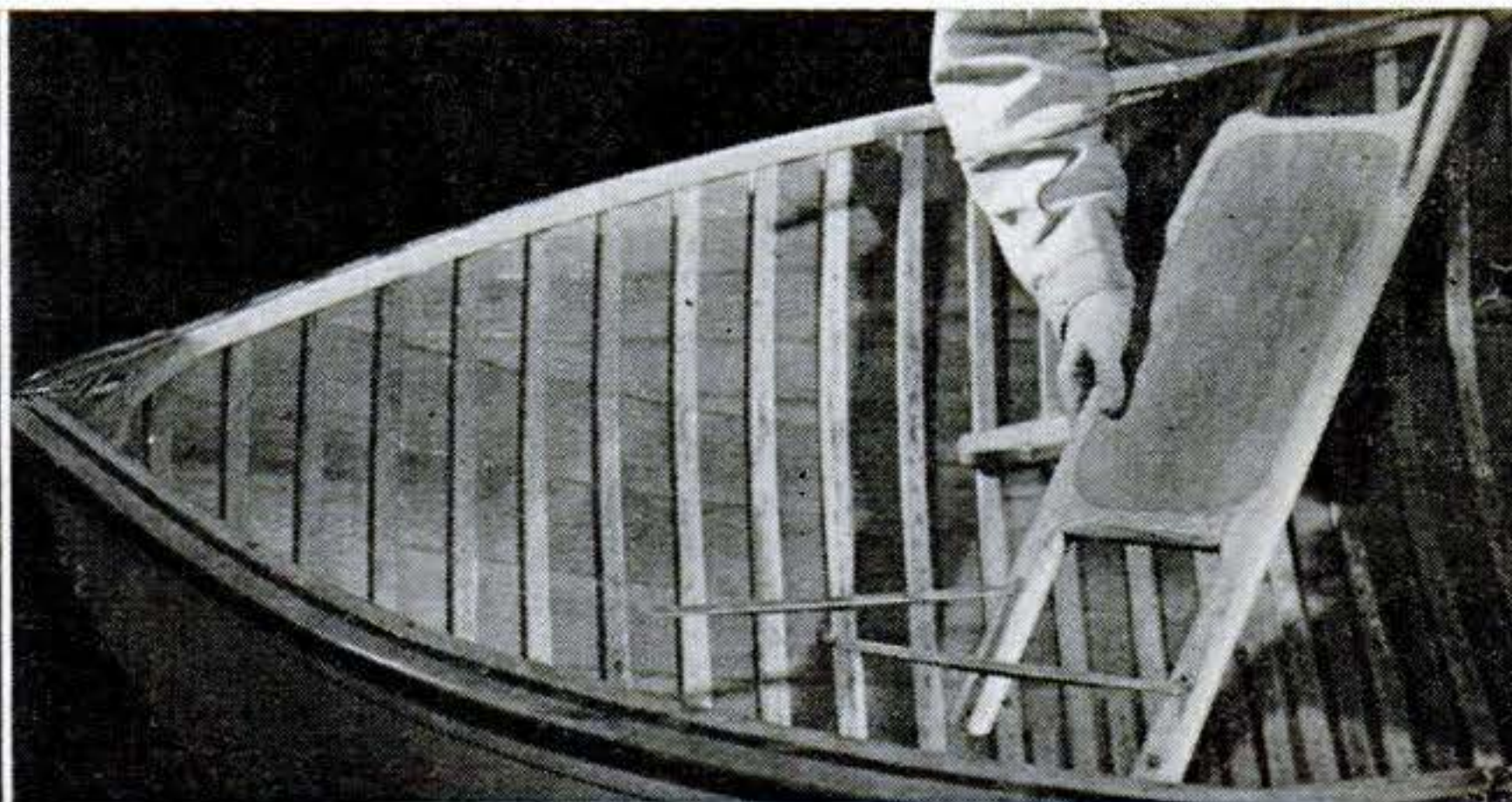




# Repairing a Canvas-Covered Dinghy



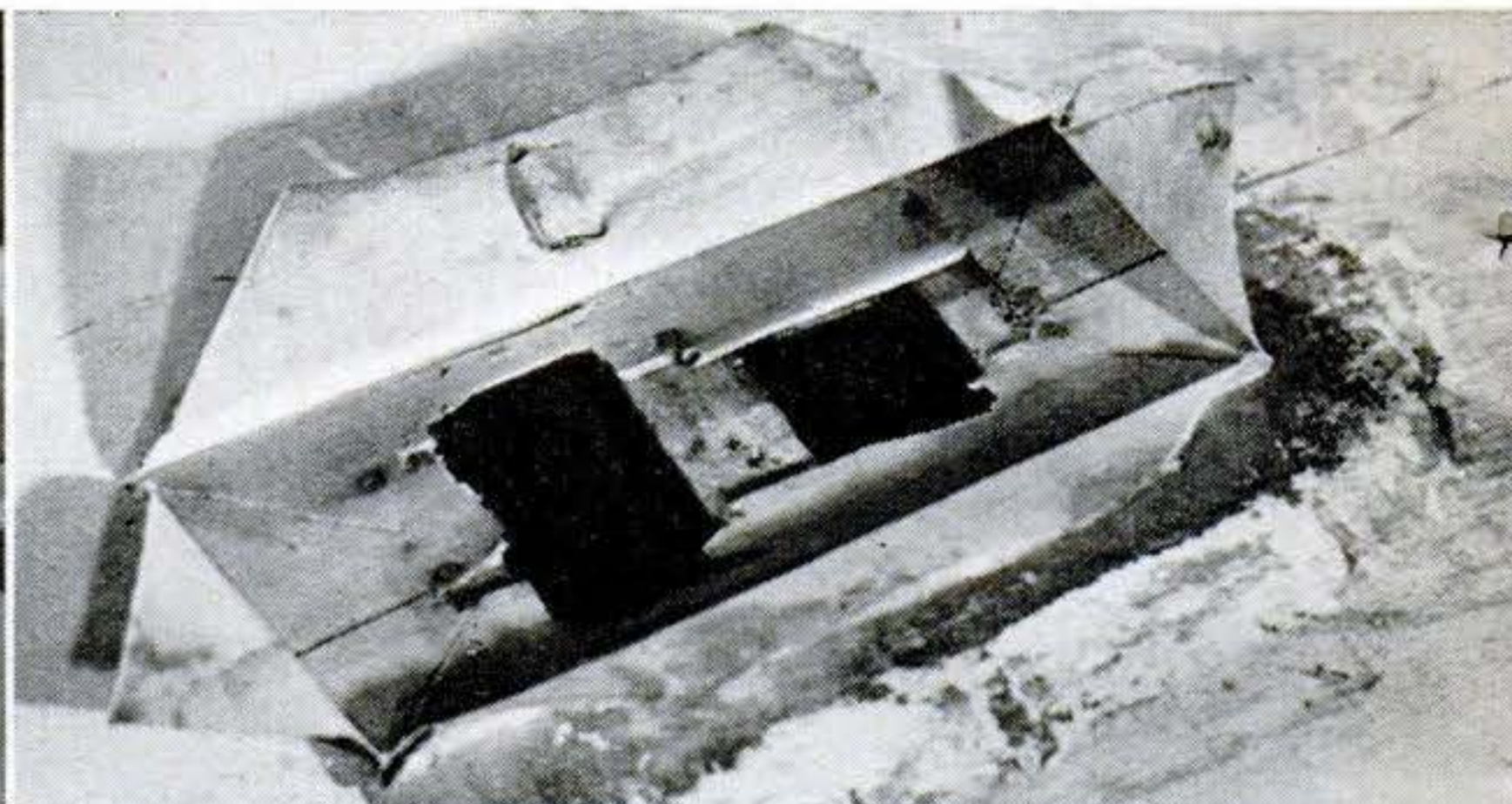
**1 REPAIR KIT** includes airplane silk, section of planking, plastic dope, marine paint, and brushes for both paint and dope.



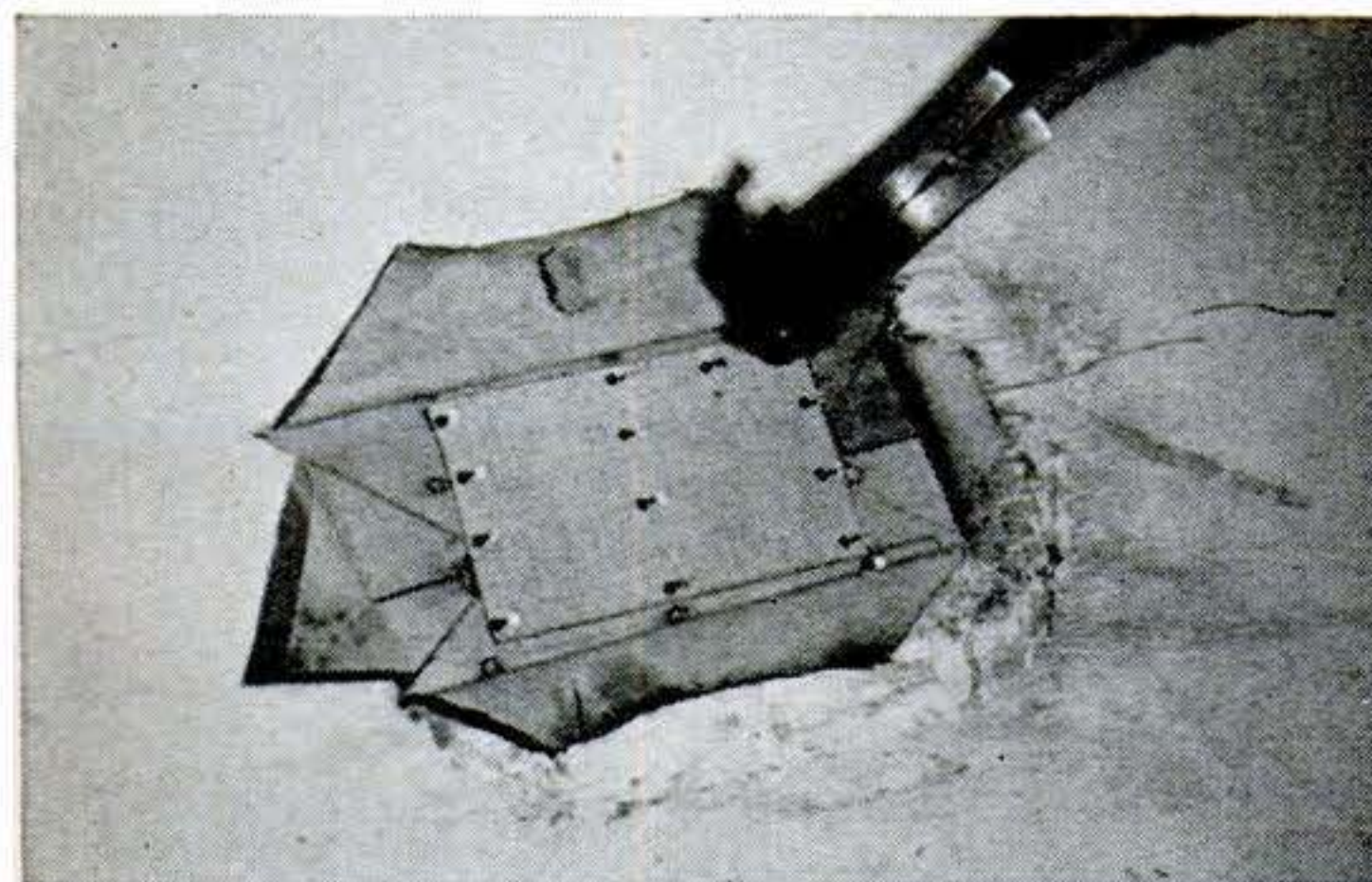
**2 REMOVE SEAT**, if necessary, so that you can reach break from both inside and outside hull. Braces and screws usually hold seats.



**5 CUT V NOTCHES** in canvas at each end of break area. Linoleum knife (above) is good tool. Make straight, accurate cuts.



**6 PULL BACK CANVAS** to expose stove-in planking plus a sizable area around break. Extra area is needed to trim broken planks.



**9 SPACE COPPER BOAT TACKS** closely. Back up area from inside hull where you are hammering. Clinch tack points back into ribs.



**10 COVER BREAK AREA** and new planking with wood filler. When dry, sand it smooth. Filler seals cracks, covers tack heads.

**A stove-in hull becomes only a memory with a patch like this. After it weathers, you won't even be able to find the spot.**

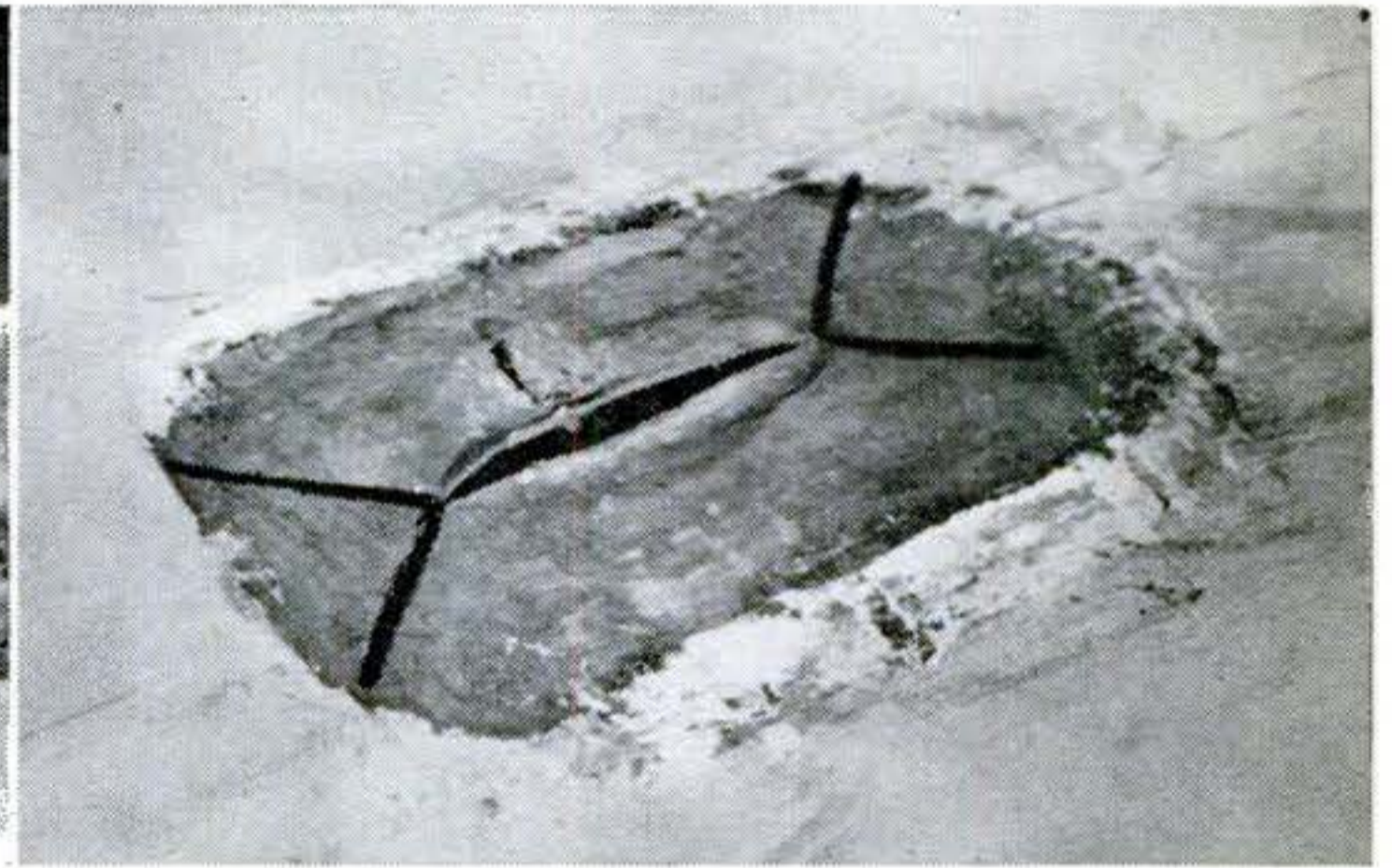
**M**Y KIDS were hauling out our dinghy when a sudden gust of wind pulled it out of their hands. It sailed across the water and smashed against a piling topped by an iron cleat. When we pulled it in, the hull revealed heart-breaking damage—a gaping

hole right in the planking on the port bow.

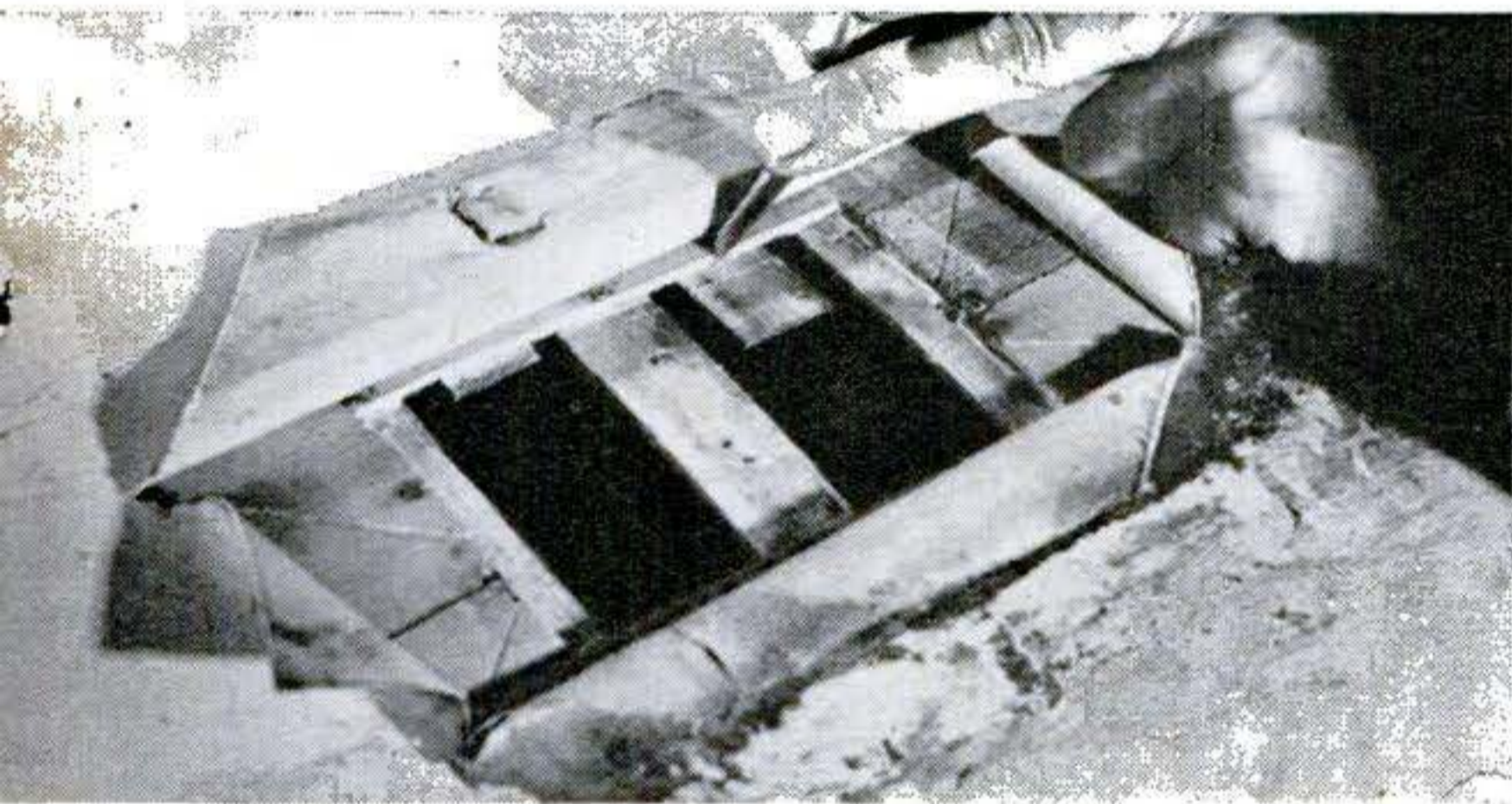
I sent for a repair kit from the maker and set to work. (There's nothing to keep you from collecting your own patching supplies, of course, but manufacturers' kits contain everything in one package, including the same kind and thickness of wood that is in the hull.) When I finished the job, I was prouder of the boat than when it was new.—*F. C. Clark Jr., Santa Fe, N. M.*



**3 REMOVE PAINT** from area around break on outside of hull. Use paint remover and scraper to take paint off to bare canvas.



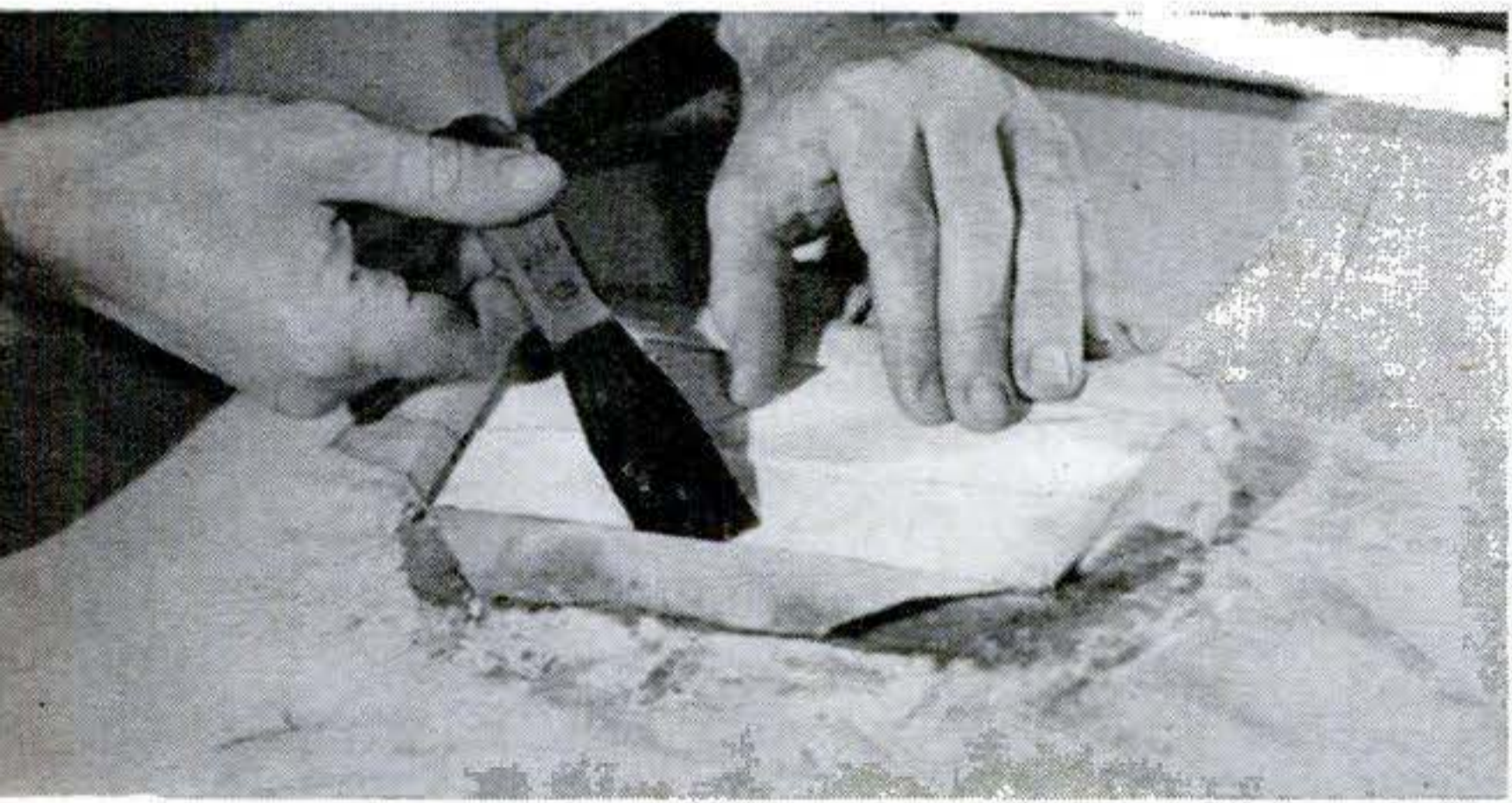
**4 LAY OUT GUIDE LINES** before cutting away canvas. Make the first cut lengthwise straight down the middle of the break.



**7 SQUARE UP SIDES** of hole to expose half of good ribs fore and aft of break. If possible, make opening wide enough to reach half ribs.



**8 MATCH NEW PLANKING** carefully to the hole. Using knife and rasp, trim for a close fit, but do not force new section in.



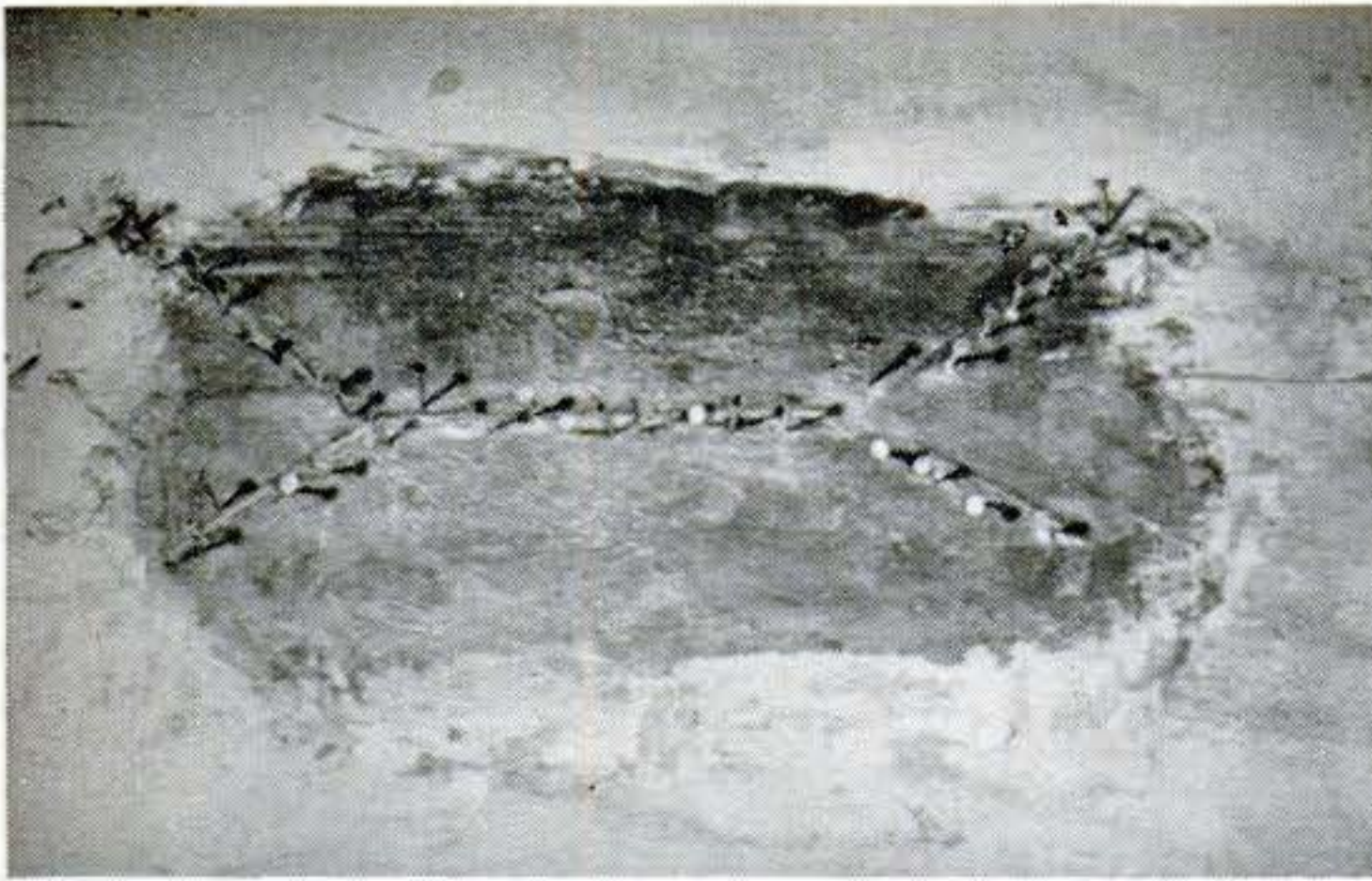
**11 TRIM SILK** to fit over new planking. Carefully tuck edges of silk patch under edges of canvas. Smooth silk out evenly.



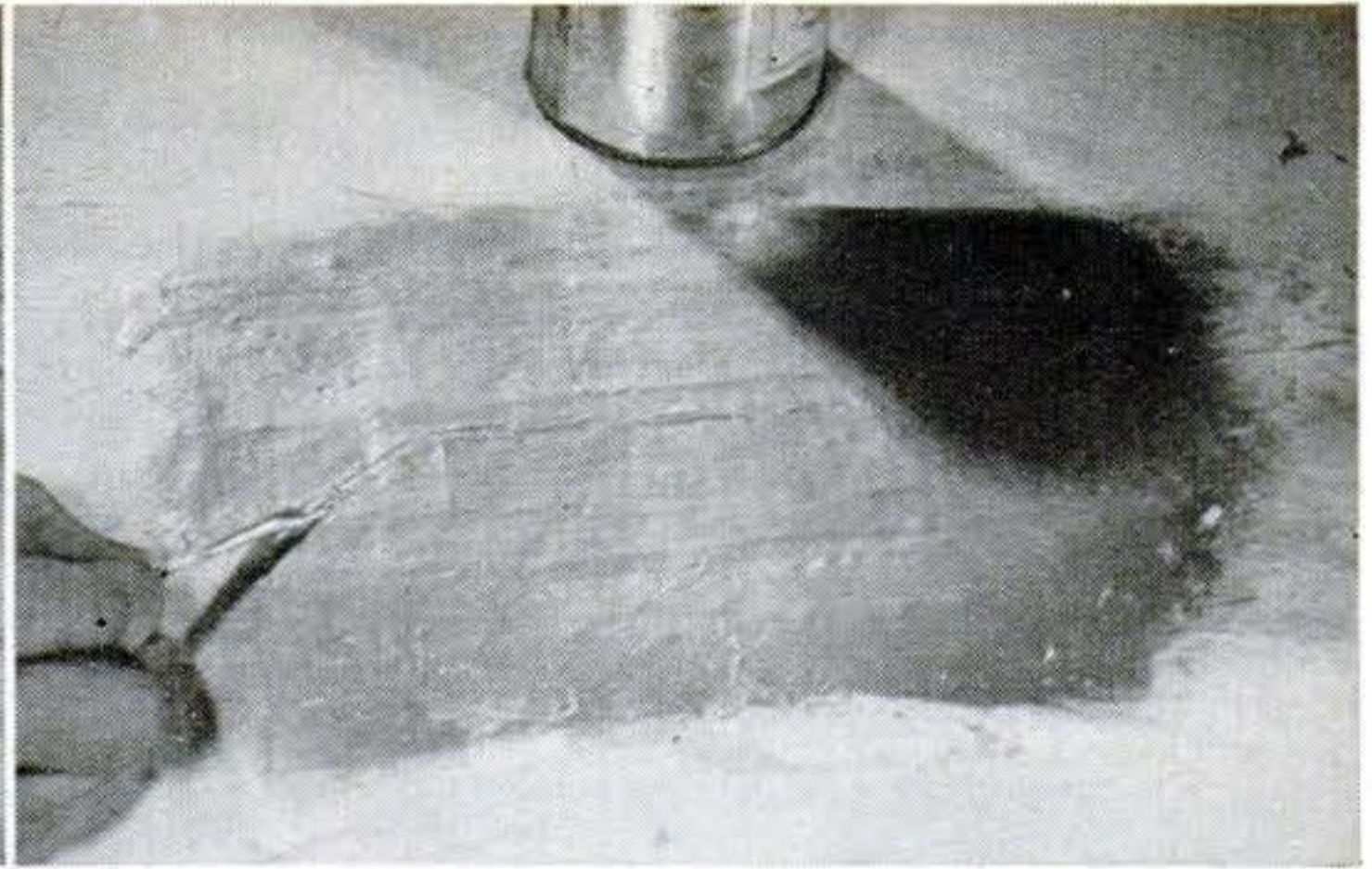
**12 BRUSH HEAVY COAT** of cement over silk patch. Be careful not to pull silk out of place with brush. Close canvas flaps quickly.

**Please turn the page for more dinghy-repair photos.**

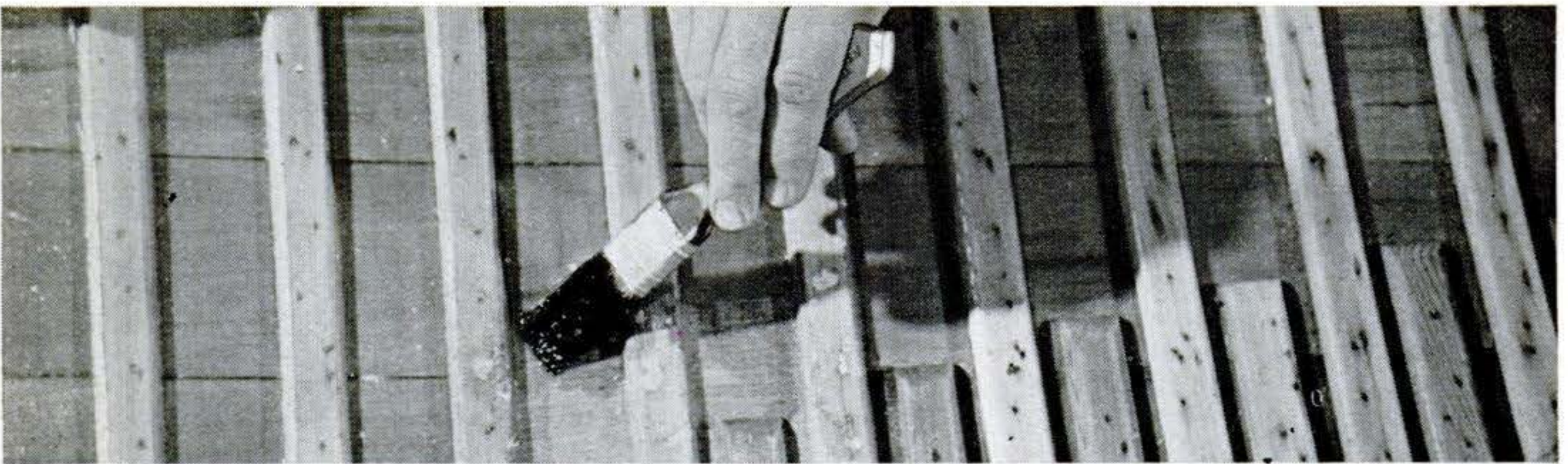
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**13 USE TACKS** along both sides of cuts to hold canvas flaps closed while cement is drying. Don't drive tacks all the way.



**14 REMOVE TACKS** when cement is dry. Then fill cracks and tack holes with cement. Sand patch when dry, apply marine paint.



**15 FINISH THE PATCHING JOB** by turning hull over and brushing three light coats of

marine varnish over the inside of the new planks. Finished patch is barely noticeable.

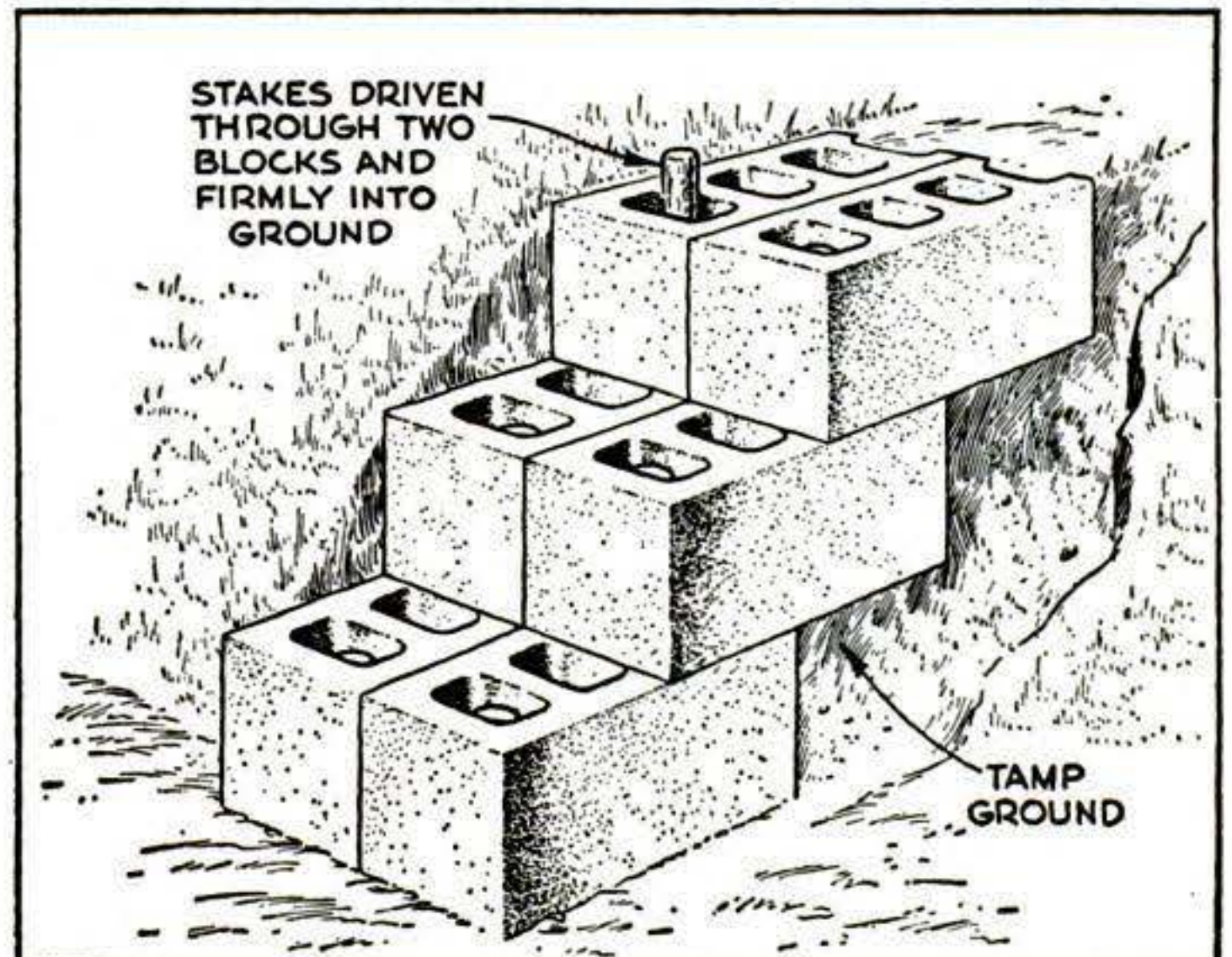
### Homemade Elevator Raises Hay

THAT back-breaking drudgery—hoisting bales of hay to the barn loft—is handled by a 50' elevator on the farm of Anderson & Sons, Castleton, Vt. The photo below shows bales dropping off the elevator onto a 50' horizontal conveyor that runs the length of the barn. A baffle board hinged to a rafter keeps the bales from upending. A reversible motor on the elevator gives farm hands a safe ride up or down.—*Eleanor Gilman, Middletown Springs, Vt.*



### Concrete Blocks Build Stairs

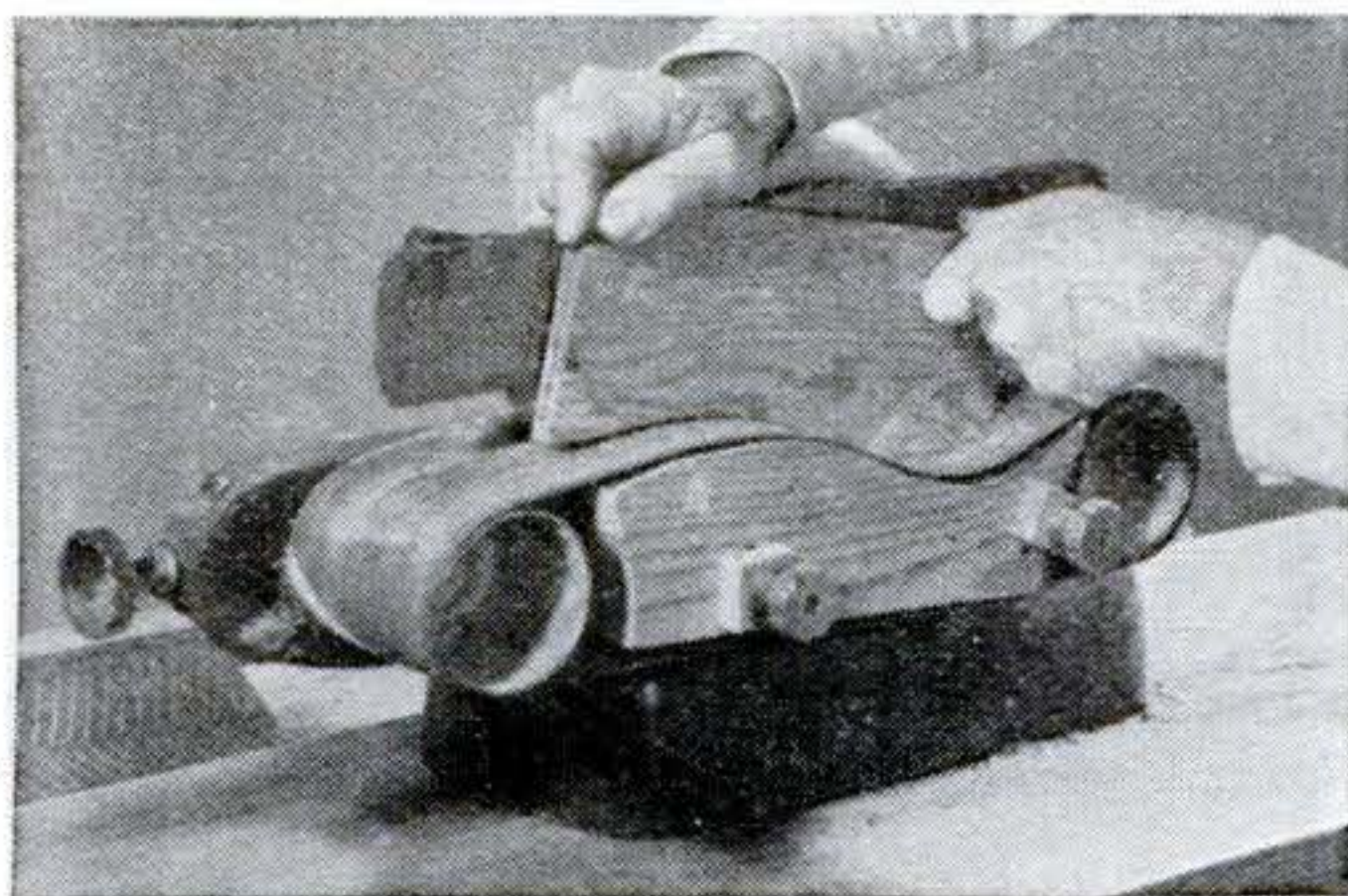
I BUILT a 60' stairway in the bank of a lake with concrete corner blocks, and the cost was under \$30. Corner blocks are best because they have one flat end. The blocks were set in the bank and staked in place. After the stakes were driven about 1" below the surface of the blocks, the openings in the blocks were filled flush with concrete (earth could be used instead). A rustic hand railing was added.—*G. Allen Burrows, Olcott, N. Y.*



# Special Setups Increase Uses for Power Sanders

Modifications of shop sanders and the use of accessories and other equipment will just about solve any smoothing problem you might face. Here are some timesaving suggestions for ways to adapt your belt sander and for using other sanding machines.

By Edwin M. Love



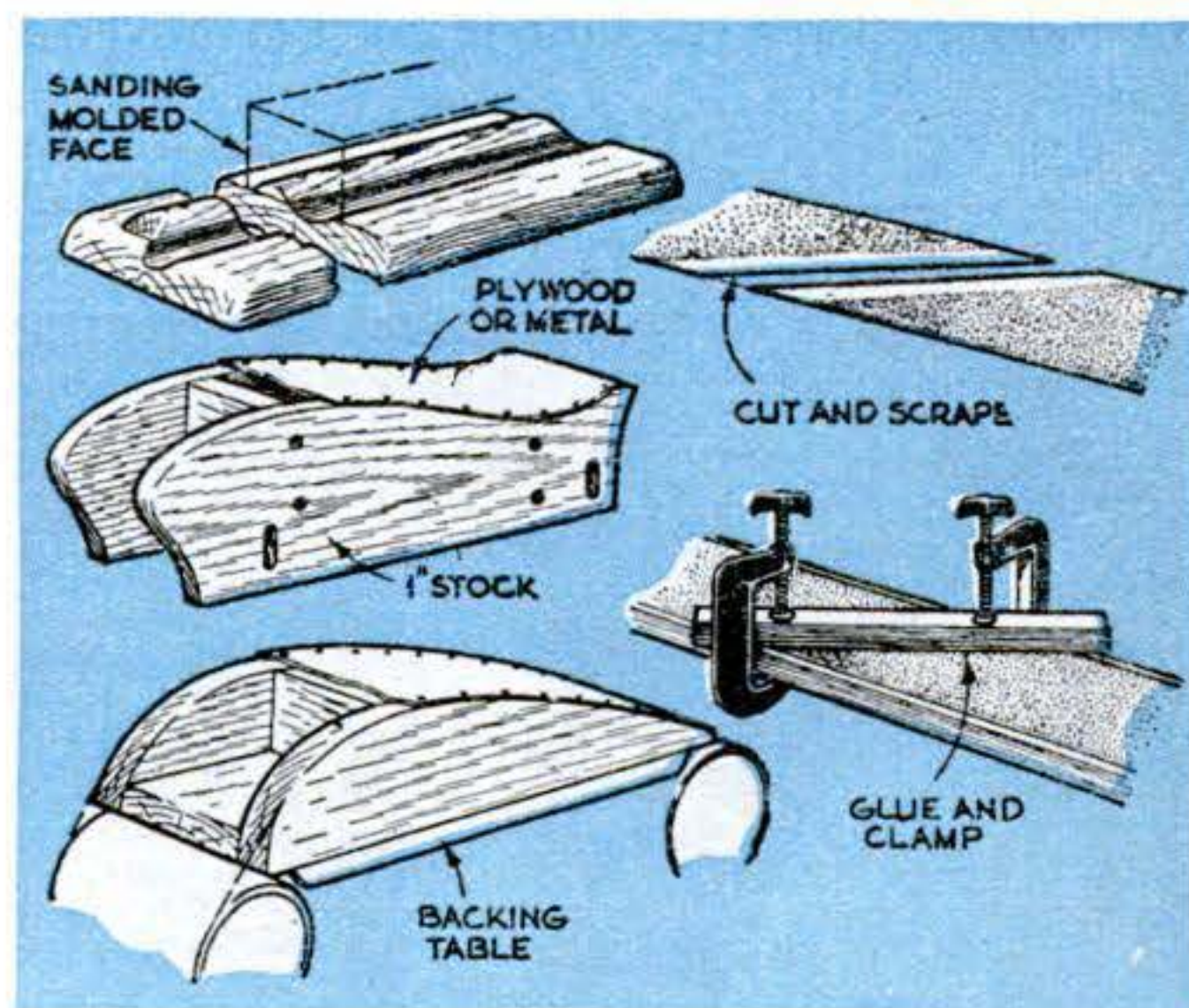
## Bench Sander Smooths Contours

YOUR belt sander, fitted with a wooden form, will smooth a wide variety of curved edges. The edges can be hollow, crowned or a combination of the two—provided the hollows are not too deep. When using a sander like this, the table that backs the belt is built up or replaced with a shaped wooden form. Then the belt is slacked off so it will fit the contour. You may need a longer belt. A hollow edge requires an arched form. A crowned edge needs a concave form.

When possible, attach the form to the top of the sander table. If the table has no screw holes, drill a couple.

You won't have much difficulty keeping the belt tight enough for good traction if the form is only arched. But hollow and combination forms are a bit more troublesome. A trial or two will show how much curvature your machine will handle.

If the fence can't be raised above the belt when the form is used, screw or clamp a wooden auxiliary fence to it. To position the work when you are sanding an irregular curve, clamp a stopblock to the rear of the fence. It will catch the end of the blank to be sanded, holding it in place.



## Forms for Belt Sander Built of Scrap

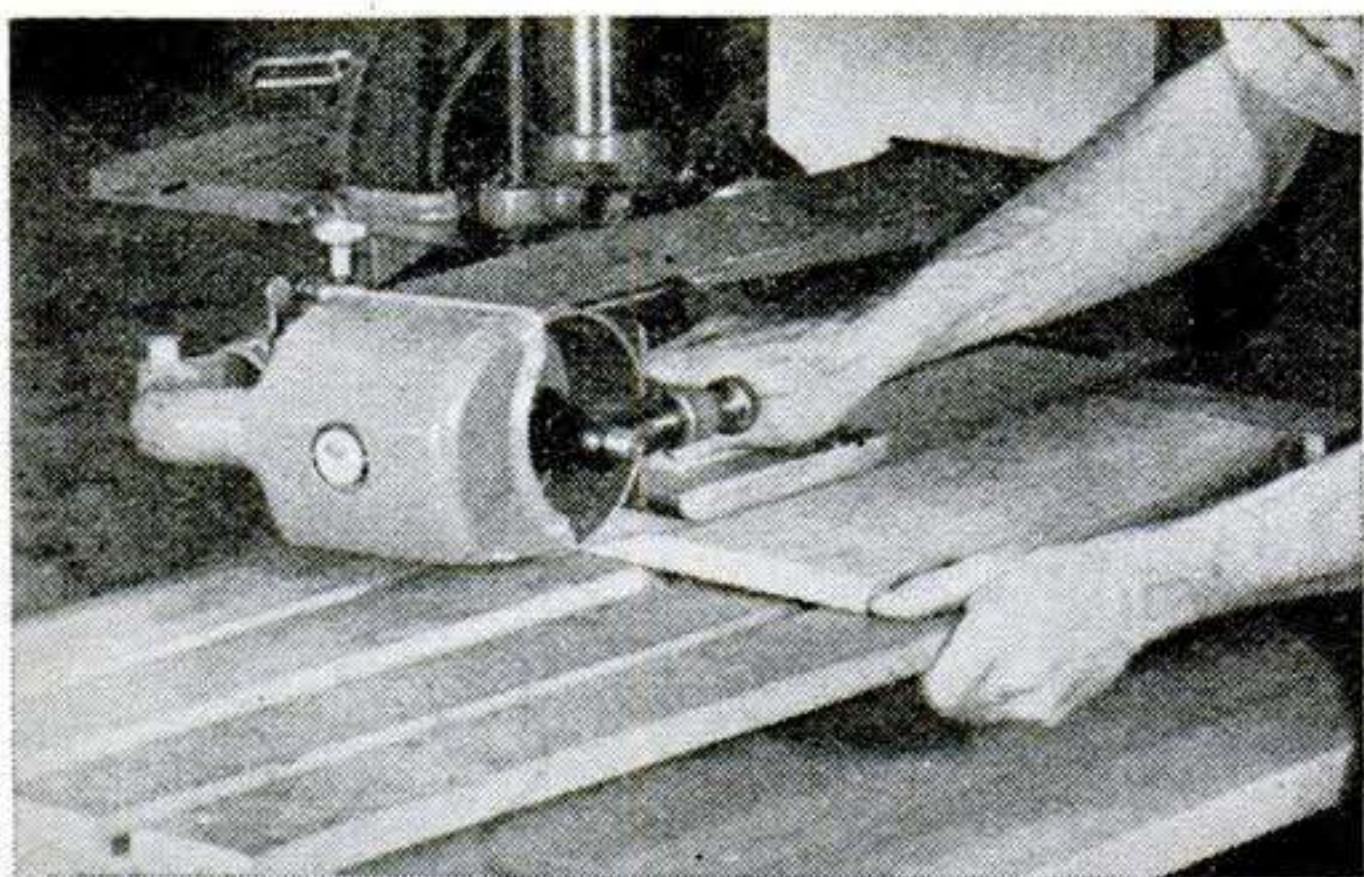
NO ELABORATE construction is needed. Saw profiles in 1" stock, join them with two or three cross members, and cover the profiles with  $\frac{1}{8}$ " plywood or sheet metal. When possible, design the form to screw to the backing table. Otherwise, remove the table and attach the form with the table's bolts. Round off the edges where the belt meets the form.

Forms can also be curved across their width, instead of lengthwise, so that the straight edge of the work will be rounded in thickness. Or a bead nailed to the top of the form will sand a cove in an edge. With a lightweight belt, an ogee or other molded shape can easily be sanded into a board.

Make up belts of special length from roll abrasive. Cut the ends at 45° and scrape off the grit for about  $\frac{1}{2}$ ". A coarse emery stick will take off the grit. Coat one end with glue, lap over the other and clamp between boards until dry. Mount the belt to run in the direction in which the work won't stub its toe on the lap.

Please turn the page for more power-sanding setups.

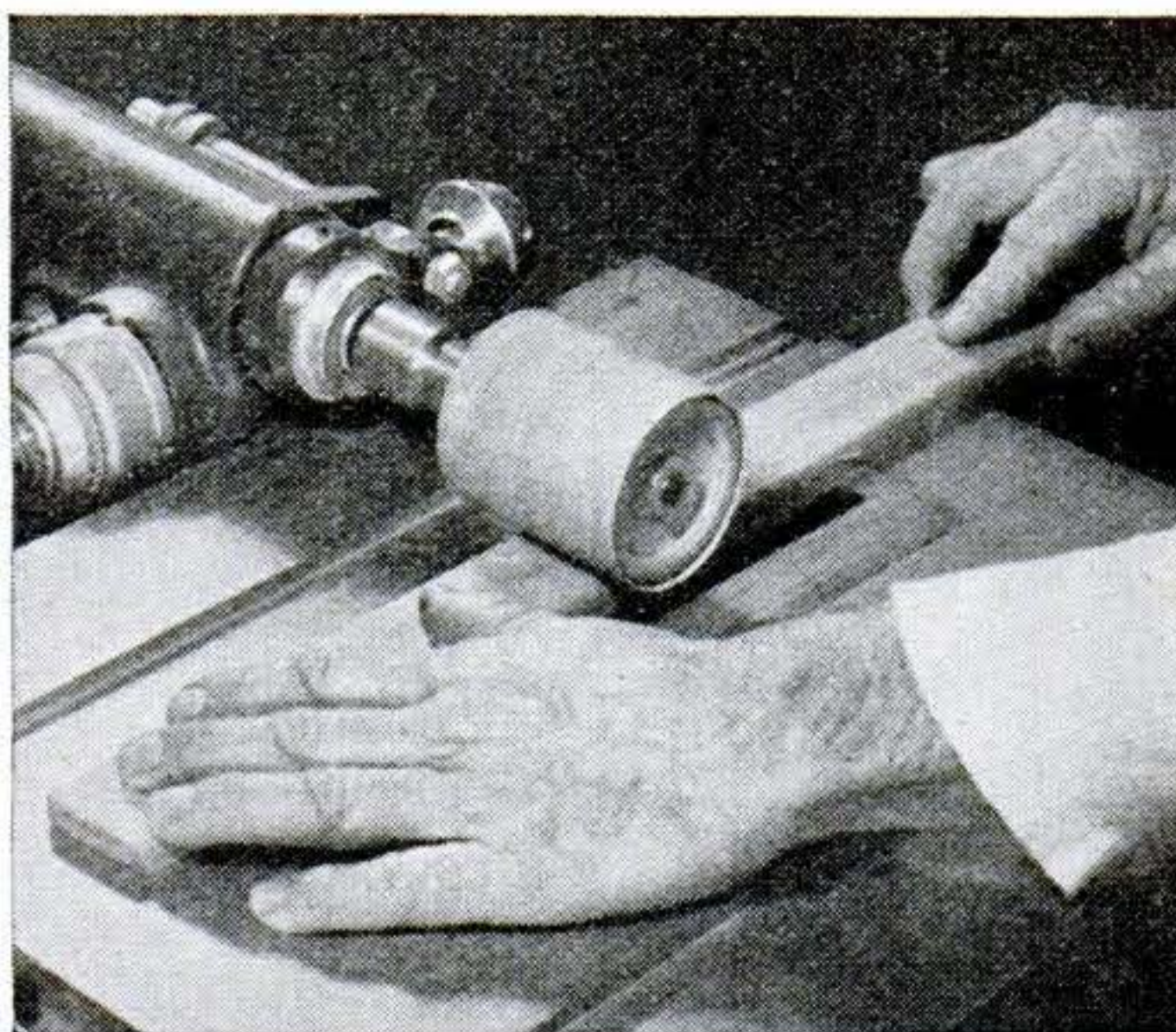
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### Mitten Ironing Sands Large Work

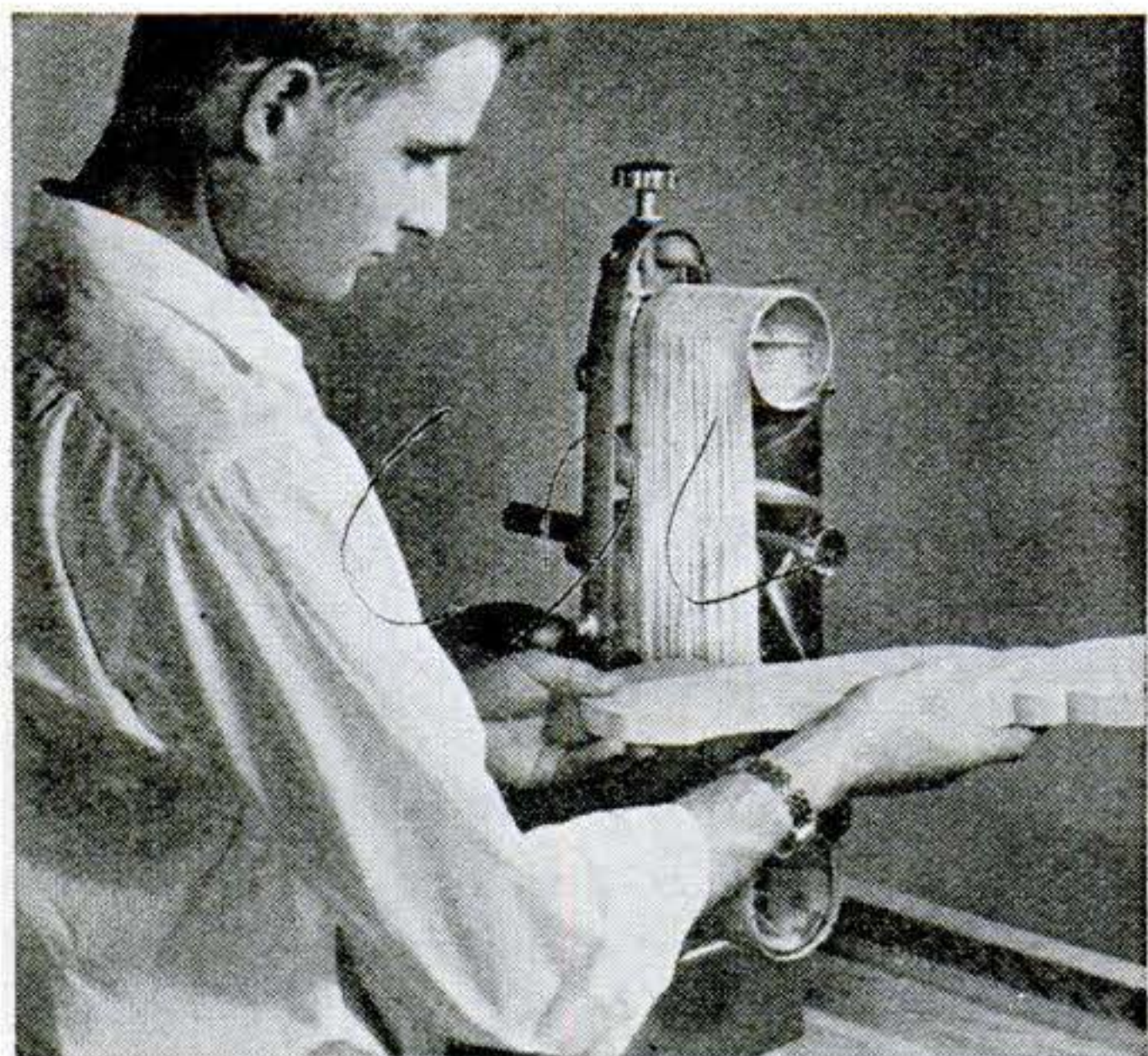
SOME belt sanders are so made that the board to be sanded can be rested on a table beneath the belt. As the machine runs, the belt is pressed down lightly with a block or mitten. The mitten is stroked back and forth with moderate pressure.

A table that is mounted on rollers can be pushed and pulled at right angles to the belt, giving smooth, even coverage. A board of almost any length can be processed if the table is made long enough to support it. To sand moldings, shape a mitten to the reversed curve.



### Drum Sands Boards to Thickness

ON SOME combination tools, like the Shop-smith, you can mount a sanding drum above the saw table. Then the work can be fed between the table and the drum to bring it to a uniform thickness. If only a small amount must be removed, pass the work through with only the spring of the rubber sleeve forcing the sandpaper against the work.

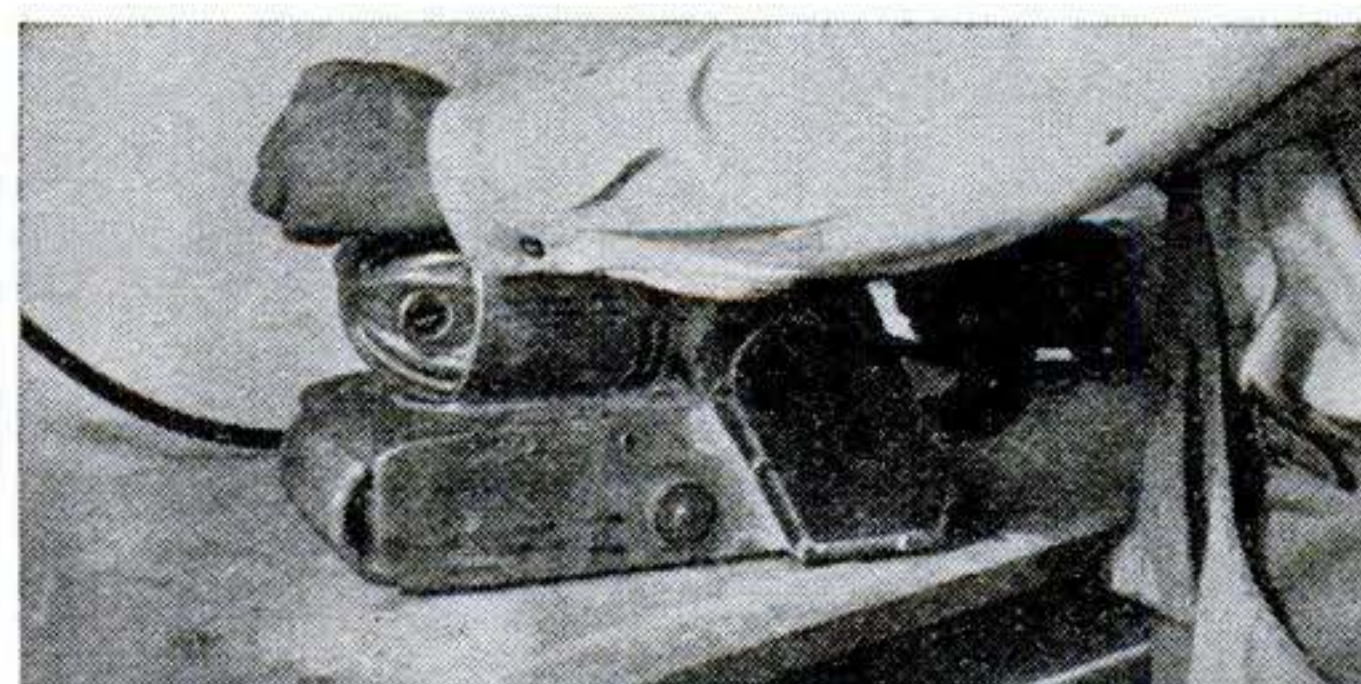


### Slashed Belt Sands Irregular Shapes

FOR work which is too irregular to be smoothed on a standard belt, try a belt that is cut into ribbons. Turn the belt inside out and divide it into sections about 6" long. Separate the 6" sections with crossbands about  $\frac{3}{8}$ " wide. Leave the  $\frac{3}{8}$ " bands uncut to tie the ribbon sections together. Fold the belt and snip through the fold every  $\frac{1}{8}$ " to make entrance holes. Then cut both ways to the crossbands.

For an occasional job, hold the work against the belt behind the machine. If you have a lot of pieces to sand, take out the backing table. Then the work can be rested on the regular sanding table where the belt travels down instead of up.

A slashed belt can also be used with a mitten for sanding grooves in flat work. The groove must be parallel to the belt.



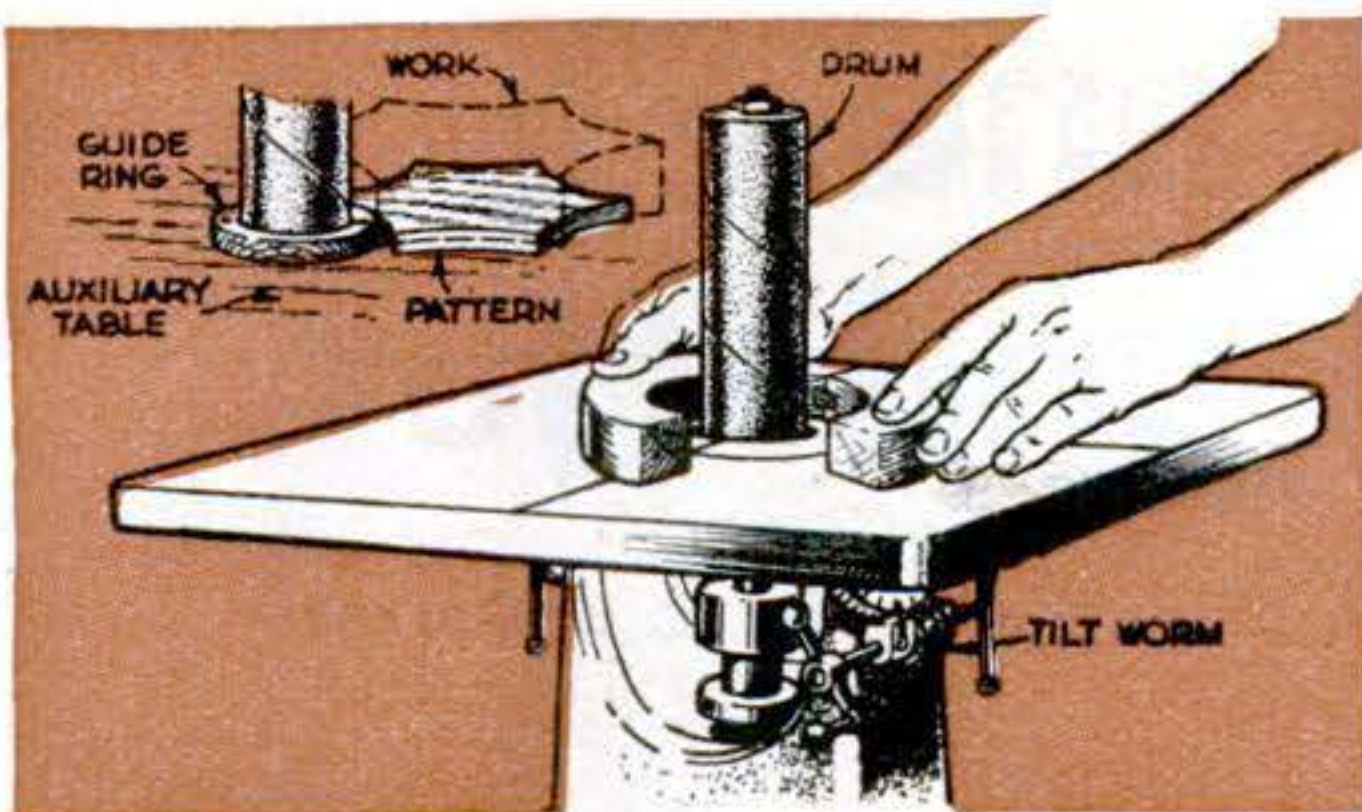
### Belt Sander Is Jack-of-All-Trades

AMONG the many jobs this versatile tool will handle are boat work, smoothing splintery lumber that would resist planing, and surfacing metal and stone. Since it can be taken to the job, it will work as well on a flat board as on an assembled cabinet. Clamped on its side, it will work as a bench sander, or as a drum sander for smoothing inside curves.

Its best use requires some skill that practice soon develops. Use this sander much like a hand plane, lifting it at the end of the work to prevent dubbing off the edge. Some mechanics keep the belt almost steadily on the work, backing the tool slowly and slewing it sideways to prevent scoring. Lift the sander occasionally and brush away accumulated wood dust that might blank out the cutting at some points. Avoid pausing while the machine is running. It will dig into the work when standing in one spot.

In such work as roughing down a counter, move the sander diagonally or across the grain to flatten the joints. Then do the finish sanding with the grain. To sand a small board, lay the board on a bench with one of its ends against a stop to keep the belt from kicking the board away.





### Spindle Sander Handles Curved Work

THIS machine has a vertical spindle that projects through a tilting table. The spindle takes elongated drums of several diameters. The spindle bobs up and down while rotating, permitting the use of coarser abrasives since scoring is reduced. This makes for faster sanding with less clogging.

Curved pieces can be square-edge sanded, as in ordinary drum sanding, or beveled by tilting the table. You can also do pattern sanding on this machine by centering a ring around the sleeve. The pattern bears against the ring. The work must be larger than the pattern so it projects beyond it to reach the drum.



### Vibration Sander Also Polishes

THE motor housing of machines like this is mounted above a sole plate to which sandpaper, abrasive cloth or a polishing pad is attached by end clips. Nearly all such sanders are portable hand tools like the one shown in the photo.

Some plates vibrate in a straight line, some in arcs and some in circles. Strokes range up to 14,000 per minute.

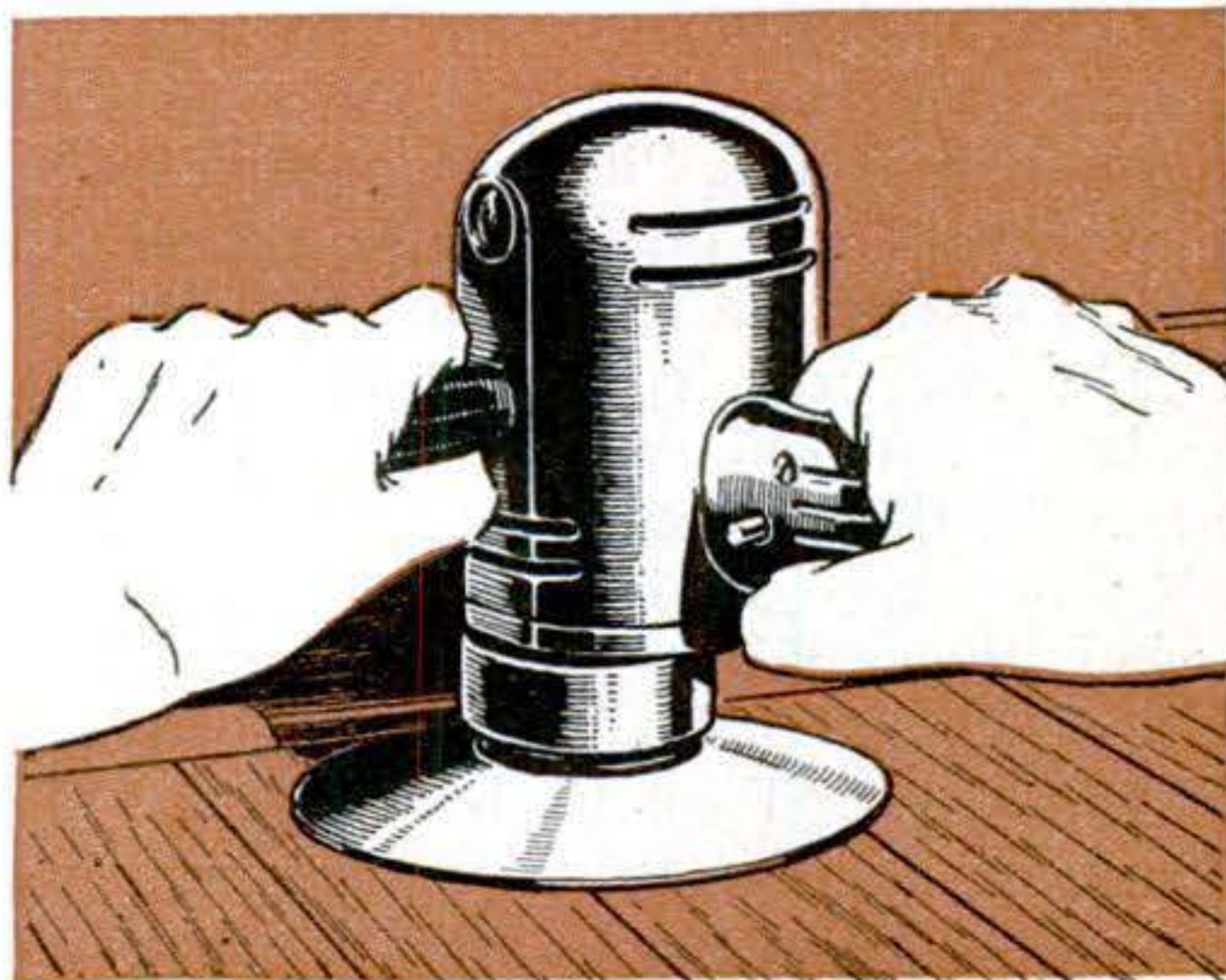
To use, move the sander evenly over the work, avoiding an accumulation of wood dust under the abrasive.



### Rotary Sander Gets into Tight Spots

TABS of sandpaper, backed by brush bristles sticking out spokewise, give this tool its flexibility in sanding all sorts of irregular surfaces. It can be mounted on a motor shaft, a drill-press spindle, a flexible shaft or a portable drill.

When the sandpaper tabs become worn or clogged, unscrew the center nut and rotate the cover counterclockwise to run out fresh abrasive. Cut off the worn tabs, leaving fresh abrasive projecting about  $\frac{1}{4}$ " beyond the brush tips. New abrasive rolls for the tool come assembled. A new one is loaded by simply removing the cover plate and inserting it.



### Disk Finishes Floors, Scours Off Paint

FLEXIBLE disk outfits are widely used in auto-body work to remove paint and do preliminary smoothing after bumping. Sanding the edges of floors is another specialty of this tool because it will work right up to the baseboard where the big floor sanders won't reach. It is also excellent for boat work.

A little practice with this sander soon teaches the pressure required. Flexibility can be decreased by clamping on two or three abrasive disks or by using a metal backing plate. A soft disk allows the abrasive to work into hollows while a stiffer disk does most of the cutting on the high spots, helping to level the surface.

Disks tend to scratch in their circular movement across the grain. Finishing with a fine abrasive reduces such cross scratches. Those that remain can be erased by a little sanding in the direction of the grain with a non-rotary sander or by hand.

# You Can Build and Fly Your Own Thunderjet

By E. L. Garrett



**It has the handsome looks of a desk model and the fly-ability of a balsa job.**

ONCE just a science-fiction dream, propellerless aircraft are proving themselves safe, maneuverable and packed with unpulled punches. Pilots are getting a whole new set of kicks out of herding these pressure torches at sound-velocity speeds.

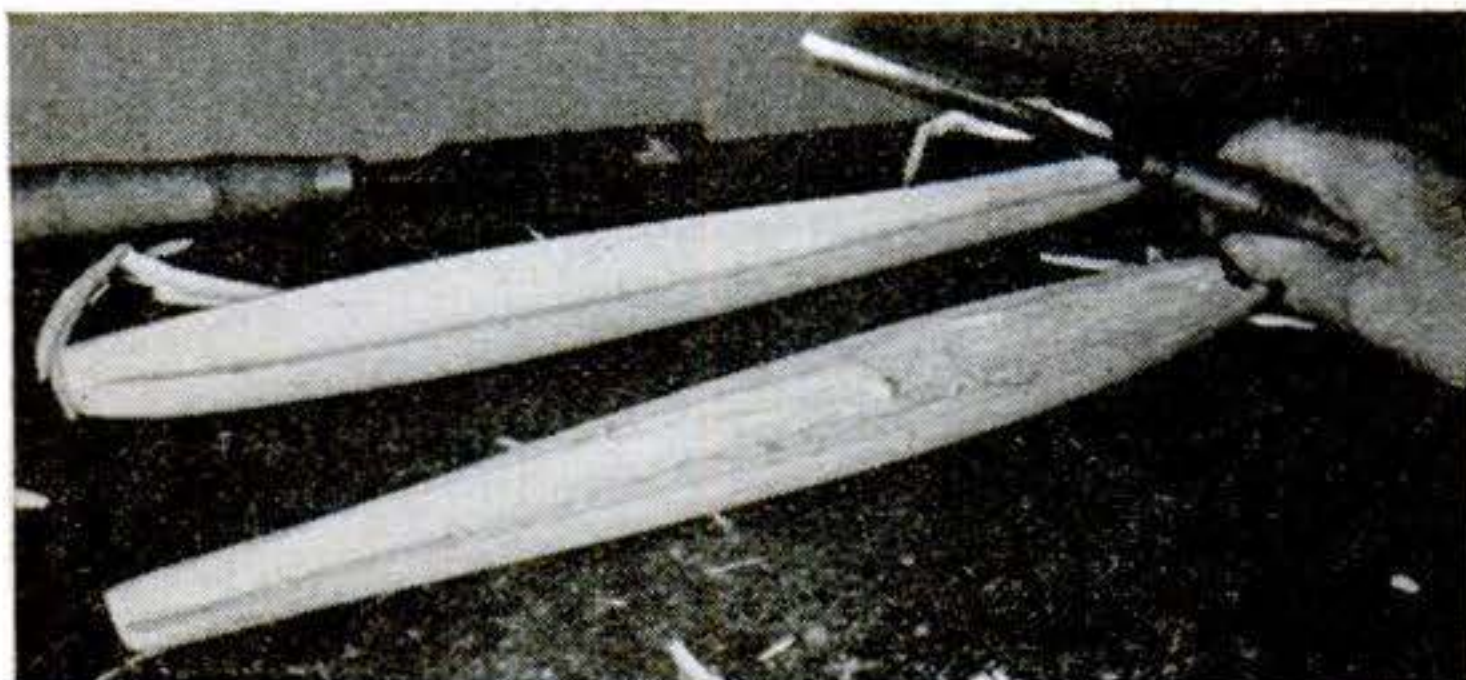
The Air Force's all-purpose Thunderjet makes a handsome model that will provide many of the thrills of actual jet flight. By choosing the straight-wing version, you avoid the difficulty of fashioning swept wings in small scale.

**Fuselage.** Two 1" by 2¼" by 15½" blocks of lightweight balsa are lightly cemented together to form a carving block. Rough-cut the block to the profile and plan views of the fuselage and finish the shaping with a sharp knife or chisel. No templates are needed to form the fuselage. The forward section is oval in shape, changing to

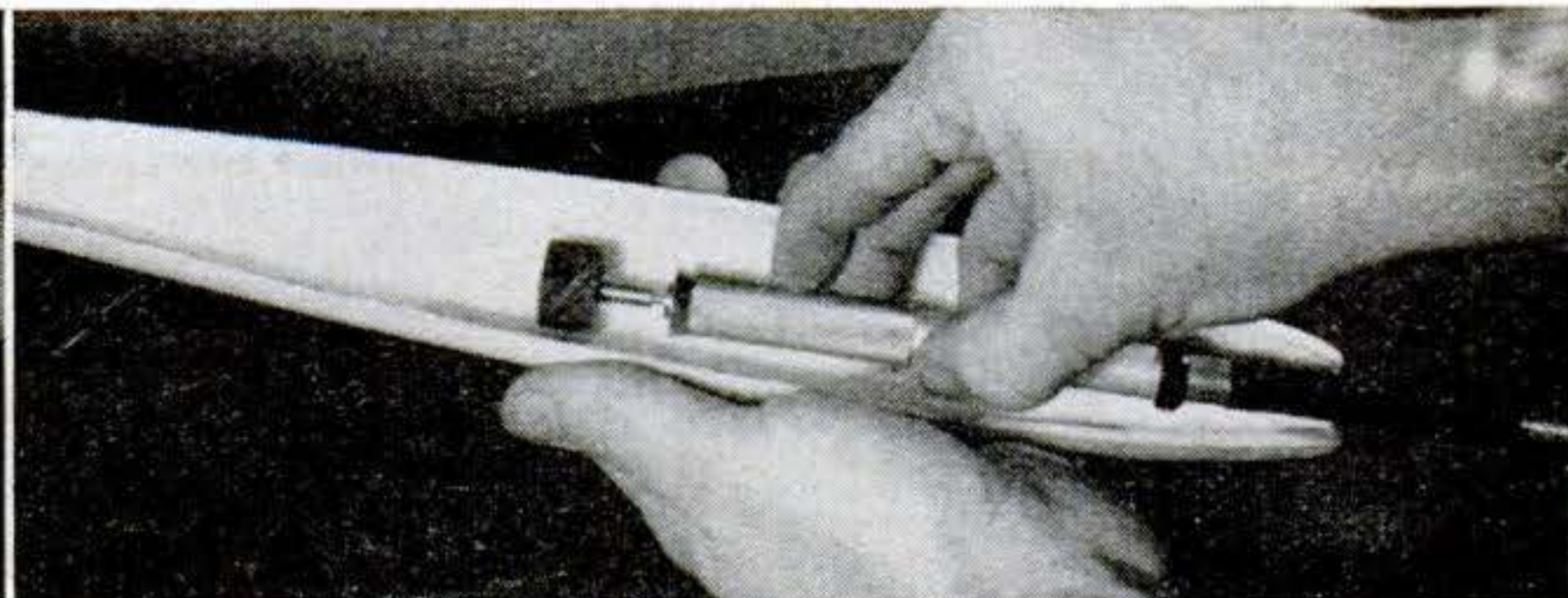
circular at the tail and extreme tip of the nose. Finish with fine sandpaper and force a double-edge razor blade into the thinly cemented joint to separate the two halves.

**Hollowing the fuselage.** Carve out the forward end to a wall thickness of about 3/16", then reduce the center section to 3/32" and the rear section to 1/16". This lightens the tail yet retains plenty of strength up front. Sand the inside smooth by hand or with a small drum sander chucked in a flexible shaft.

Cut notches for the flattened tube that secures the nose wheel, and fit the two half-bulkheads in place. Now cement the two halves together, using a slow-drying cement, and wrap the fuselage with model-plane



**1 FUSELAGE HALVES** are hollowed out with 3/8" gouge, well sharpened. Exterior shape is first carved from 1" balsa blocks lightly joined with cement; then halves are pried apart.

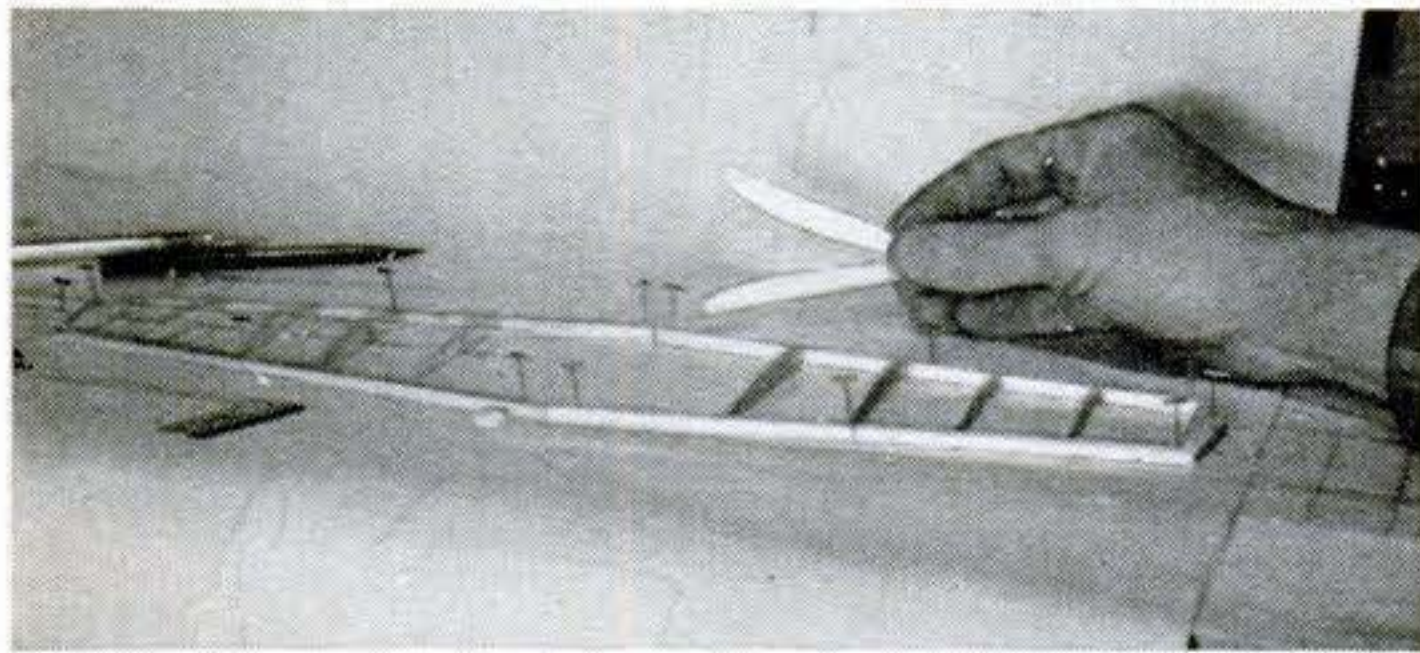


**2 SMOOTH INSIDE** of fuselage with sandpaper or small sanding drum in flexible shaft. Check constantly for thin spots by holding work up to a strong light.

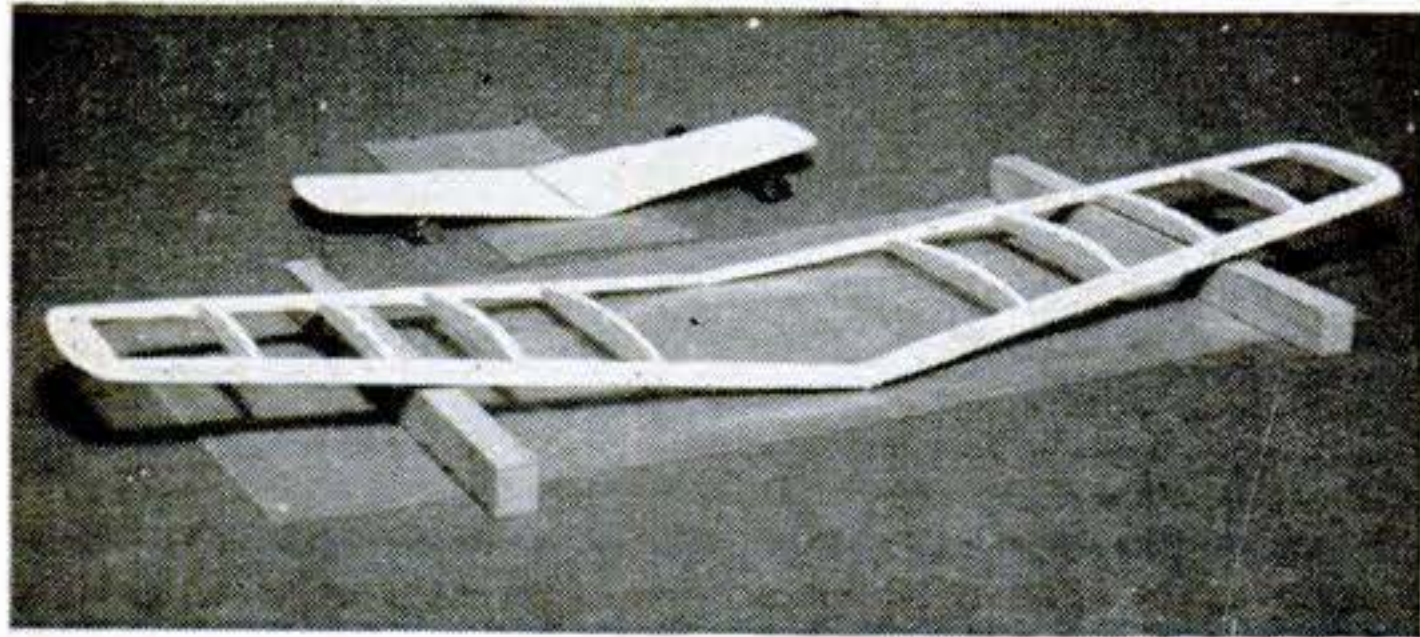


$\frac{1}{8}$ " balsa braces along the inside of the hatch opening. Brace the hatch cover with two balsa segments and cement the spring clips, bent from pins, in place.

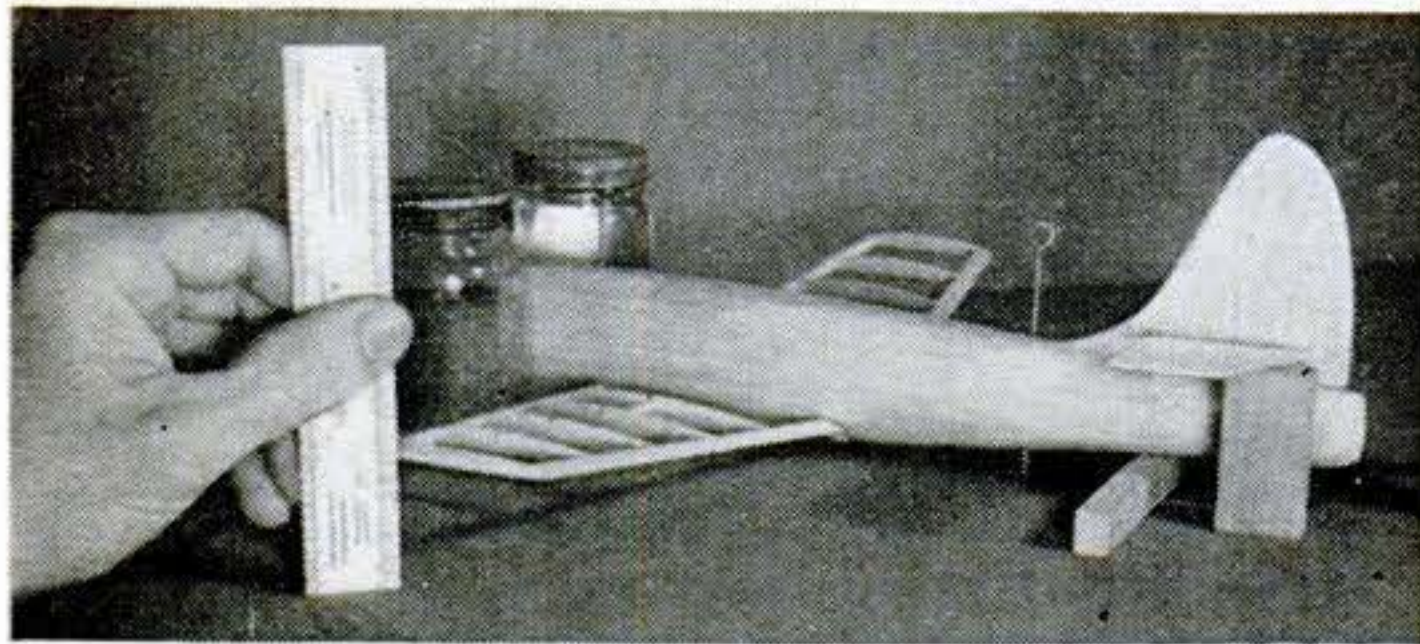
**Wing and stabilizer.** Enlarge the wing plan to full size, cover it with wax paper and



**5 WINGS** are assembled directly on plan covered with wax paper to prevent sticking. Wing ribs are cut in pairs for uniformity. Note No. 3 ribs are  $\frac{1}{8}$ " thick, others  $\frac{1}{16}$ ".



**6 DIHEDRAL** of wing and stabilizer is obtained by blocking up tips while cementing. Wing tips are raised  $1\frac{1}{4}$ ", stabilizer tips  $\frac{7}{16}$ ". Bevel meeting edges so they butt securely.



**7 WING AND STABILIZER** are checked against vertical rudder when cementing in place. Hatch has been cut out and fuselage notched for leading and trailing edges of wing.



**8 HAND LAUNCHING**, with wheels removed, is recommended for flying the Thunderjet. Fuse is ignited with cigarette or punk and plane held until jet unit hisses vigorously.

assemble the framework on it, using pins to hold the parts together while cementing. Notch the ribs for the top spar after they have been assembled to insure alignment. Block up the two wing halves, bevel the inside edges and cement them together. Notch out the hatch opening for the leading and trailing edges and cement the wing to the fuselage, using the rudder as reference for aligning it. Now cement the top spars in the rib notches, butting the ends firmly against the outside of the fuselage.

Cut the stabilizer halves from  $\frac{1}{16}$ " balsa, bevel the edges and cement them together. When dry, insert the stabilizer in the slot in the rudder and cement the joint.

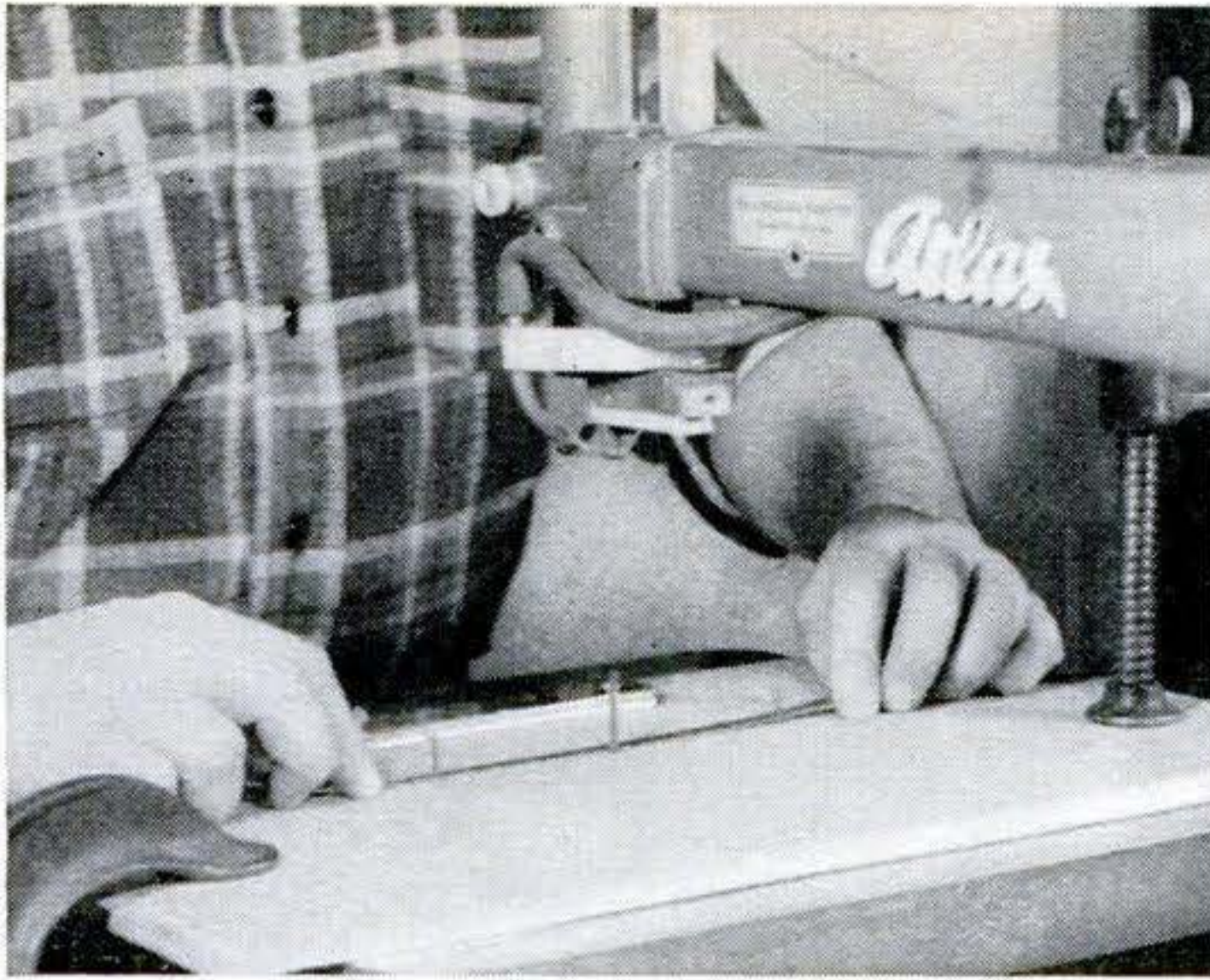
**Landing gear.** The prototype flies with wheels retracted; on our model the wheels should be removed for flight to get rid of their weight. Use .045" music wire for the landing gear, bending the ends to spring into the flattened tubing in the nose and on the No. 3 wing ribs. Slip radio spaghetti over the nose-wheel wire and cement  $\frac{1}{16}$ " balsa wheel-well fairings over the landing-wheel wires.

**Jet Engine.** I used a Jetex, a British-made solid fuel engine that's sold complete with holding clip, a coil of fuse wire and cartridge refills. Fasten the holding clip to a strip of  $\frac{1}{8}$ " cigar-box wood or plywood and cement the strip between the two bulkheads, centering the jet-engine orifice in the tail opening. Line the engine compartment and the inside of the hatch with household aluminum foil to protect the balsa from sparks. Roll up a tube of this foil and insert it in the tail opening to carry the hot exhaust gases through. The jet engine delivers full power for about 20 seconds.

**Finish.** Seal the fuselage and tail surfaces with two coats of balsa sealer. Sand smooth and paint the entire plane with silver model-airplane dope. Mask off the nose and tail and paint them red. Do the black center strip in the same way. The canopy, decals and wheels are available at large hobby shops. Control surfaces can be outlined with black decal material or paint.

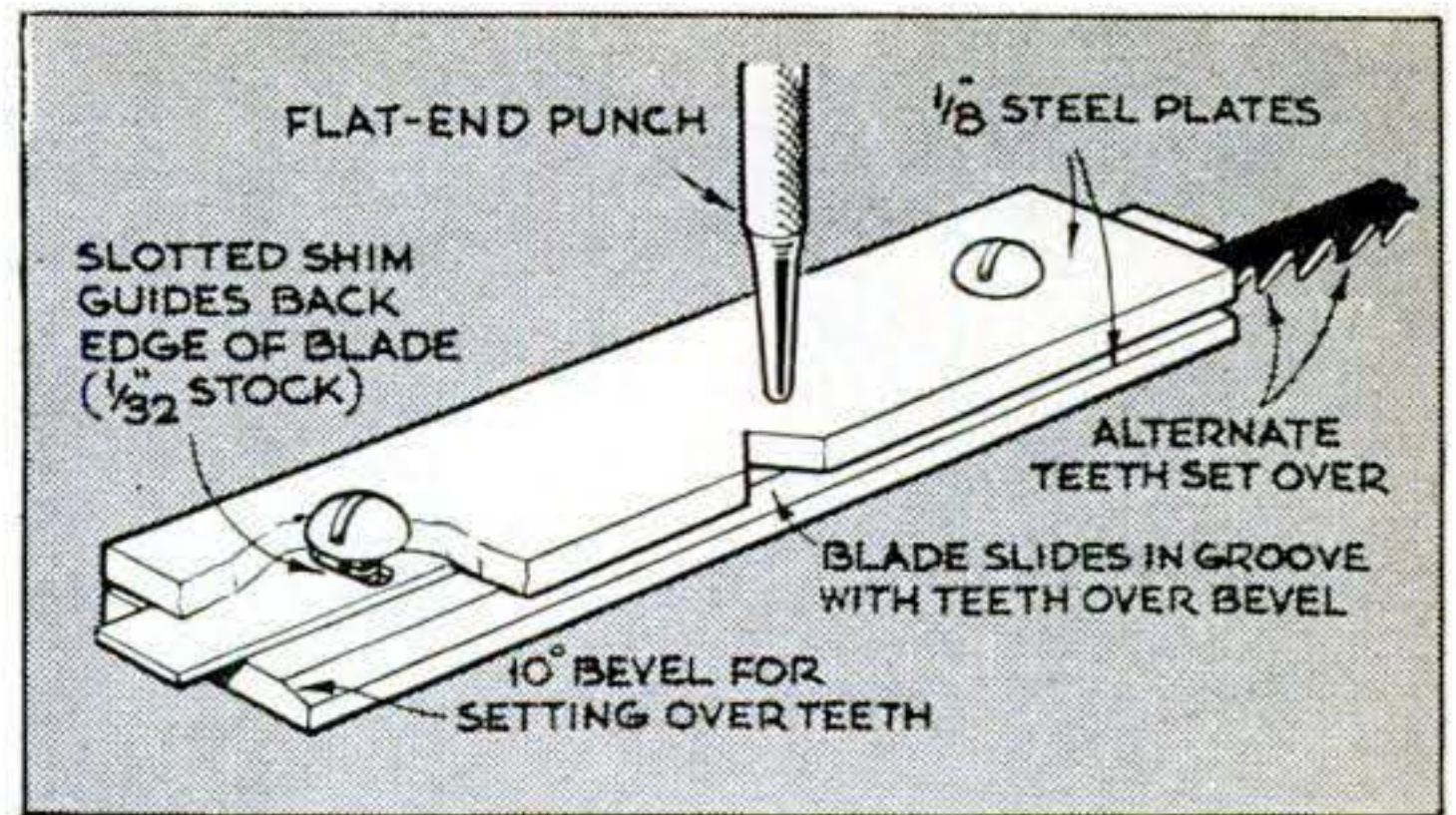
**Flight tests.** Before sending the ship up under its own power, make hand-launched glides with the jet unit in place to check its balance. If it stalls, add weight to the nose. If it dives, load the tail. Launching is ideally a two-person job, with one ready to snap on the hatch while the other lights the fuse. The foil tube is slid back for loading and lighting, then pushed forward.

## Bandsaw Blades Maintained with Homemade Jigs



THESE simple setting and sharpening jigs keep bandsaw blades cutting smoothly.

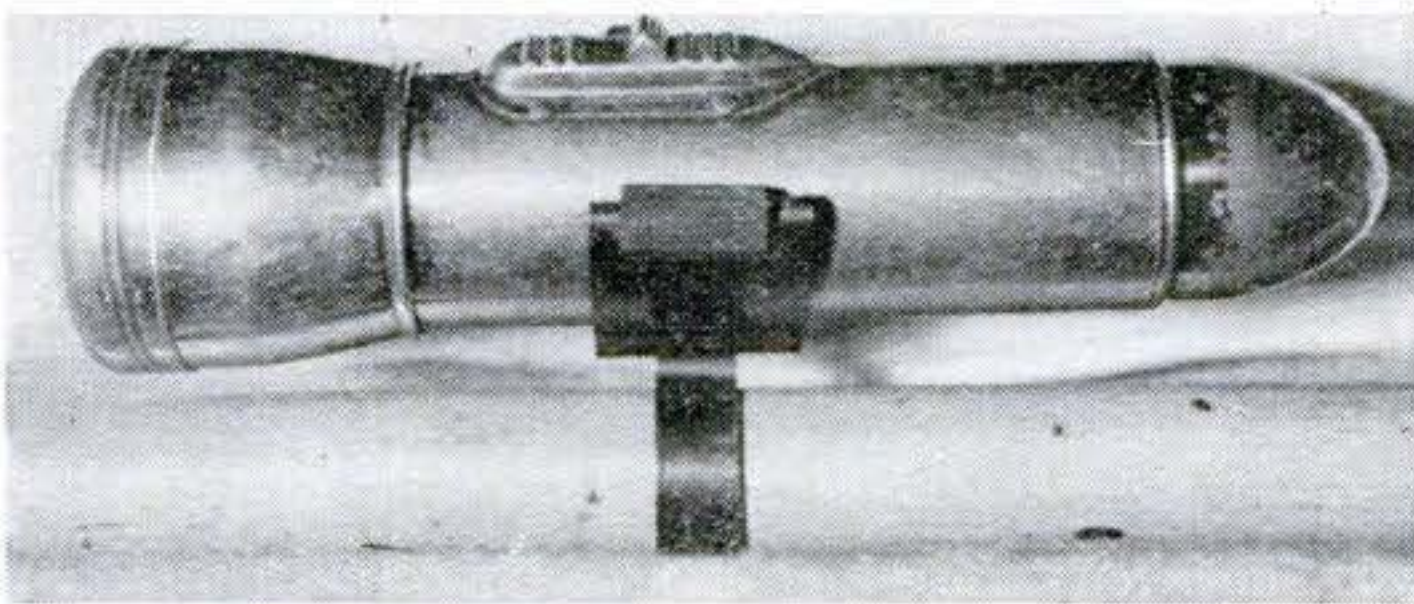
The setting jig (drawing) does a uniform job of setting the saw teeth to the required 10°. The two 1/8" steel plates are joined with machine screws. An adjustable shim between them can be set to guide blades of various widths along the bevel. Alternate



teeth are set in one pass around and the blade is inverted for the opposite setting.

The blade is sharpened with a triangular machine file mounted in the jigsaw (photo). The escutcheon pins space the teeth for filing and control the filing depth. A tooth on the portion of the blade held in the right hand is hooked on the locating pin and the blade advanced into the file with the left hand until it touches the other pin. The operation is repeated on each tooth in succession.—H. Neustadt, N. Y. C.

## Flashlight Holder for Campers



YOUR flashlight will be handy at night if you fix it to the cot frame with a snap-in clamp. You can use a clamp that makes a bicycle headlight out of a flashlight, or one that holds a flash to an auto steering column.—J. M. Avery, Dexter, N. Y.

## Shellac Stored in Paste Pot



SHELLAC has a lot of workshop uses but often only a touch is needed. To avoid the bother of cleaning up brush and utensils after using, keep a little shellac in a paste pot—the kind with a center well for the brush. Put a little alcohol in the well to keep the brush soft. Shellac in the outer compartment is always ready to use.—R. F. Donovan, Guttenberg, N. J.

## My Most Ingenious Solution

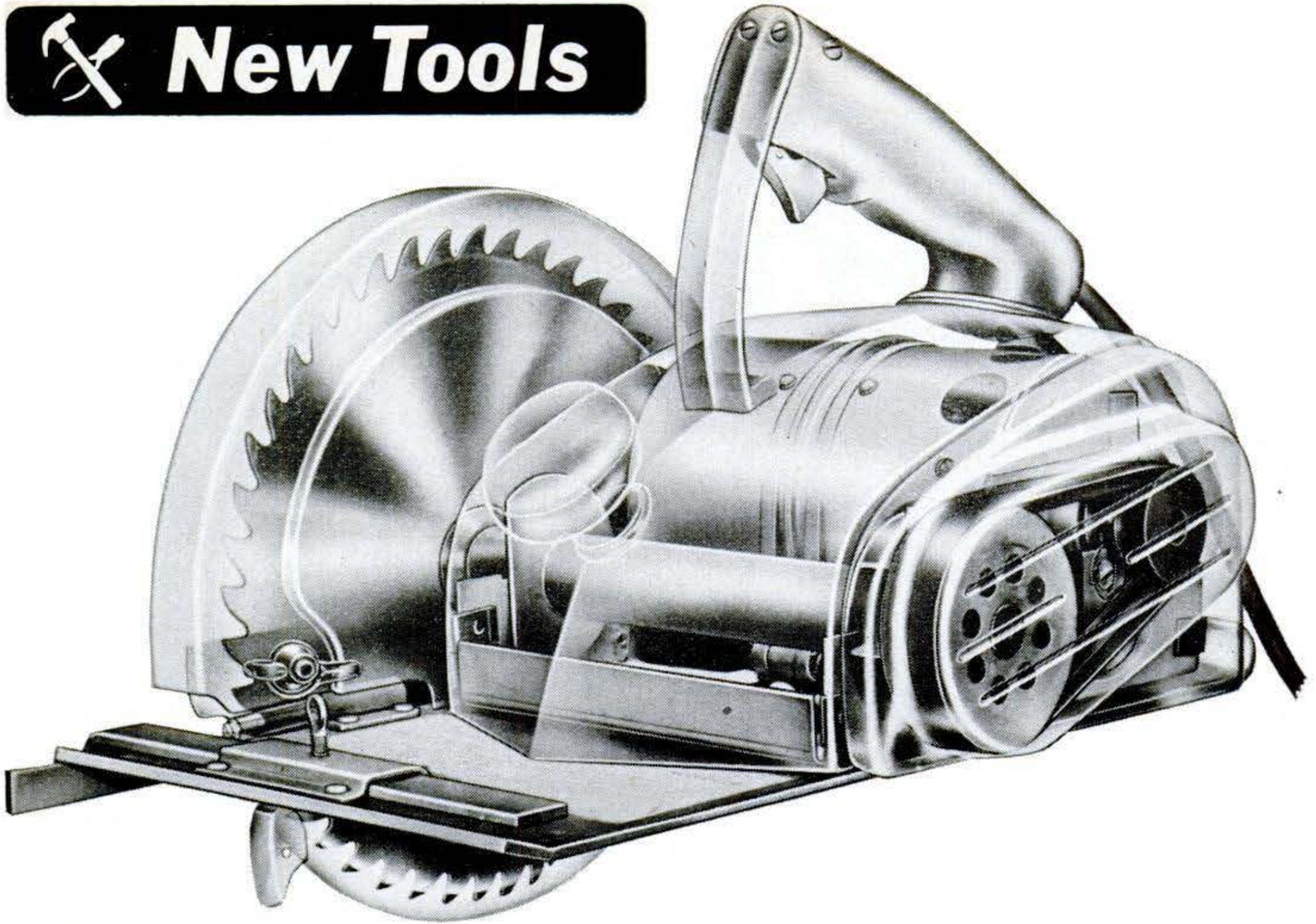


My car developed a leak around a door post. The previous owner had installed special rubber gutters, and the sealing compound was leaking at one point. I couldn't see the hole, and garagemen told me it sometimes took hours to track down a pin-hole leak. I did it a lot faster than that.

I took a small can of talcum and powdered the door post and gutters from top to bottom. I closed the door and hosed the outside thoroughly. When I opened the door I found a trail of water seeping through the powder that pointed right at the leak. It took only a few minutes to re-seal the spot.—Frank L. Nickerson, Seattle



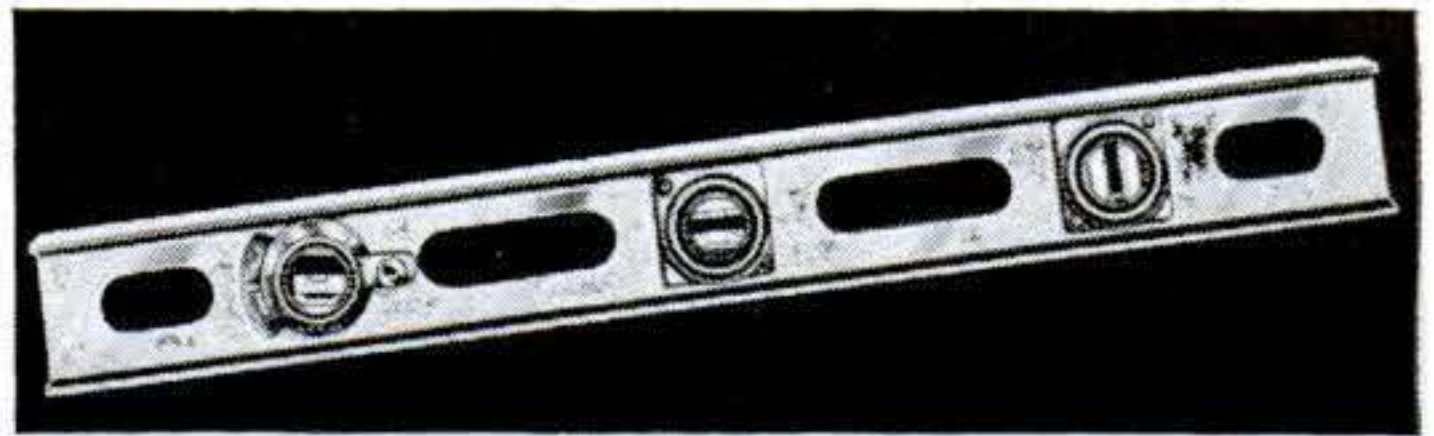
# New Tools



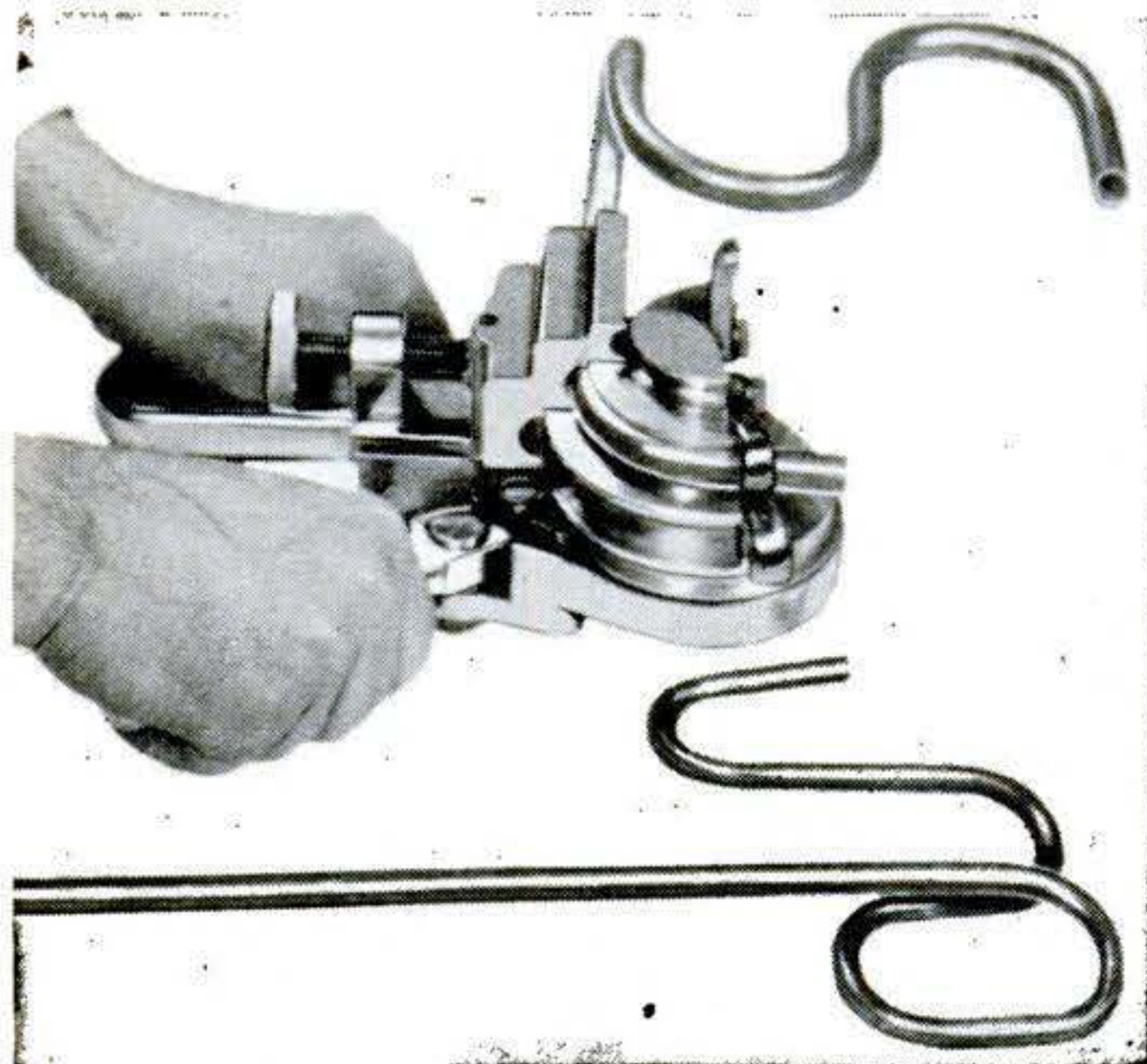
**1 Portable Saw Is Gearless.** Two V belts transfer power from the 1½-hp. motor to the 8½" blade in this saw. There are no

gears. The action of the belts tends to protect the 9-amp., 6,000-r.p.m. motor from shocks of stalls. Depth of cut is 2 11/16".

**2 Tube Bender Takes Three Sizes.** Copper and other lightweight tubing of 3/8", 1/2" and 5/8" outside diameters can be bent up to 180° or offset with this tool. Weighing only five pounds, it can be carried easily to the job. No vise or fixtures are required. In use, the tubing is locked in one of the three steps and wrapped around the step to make the bend.

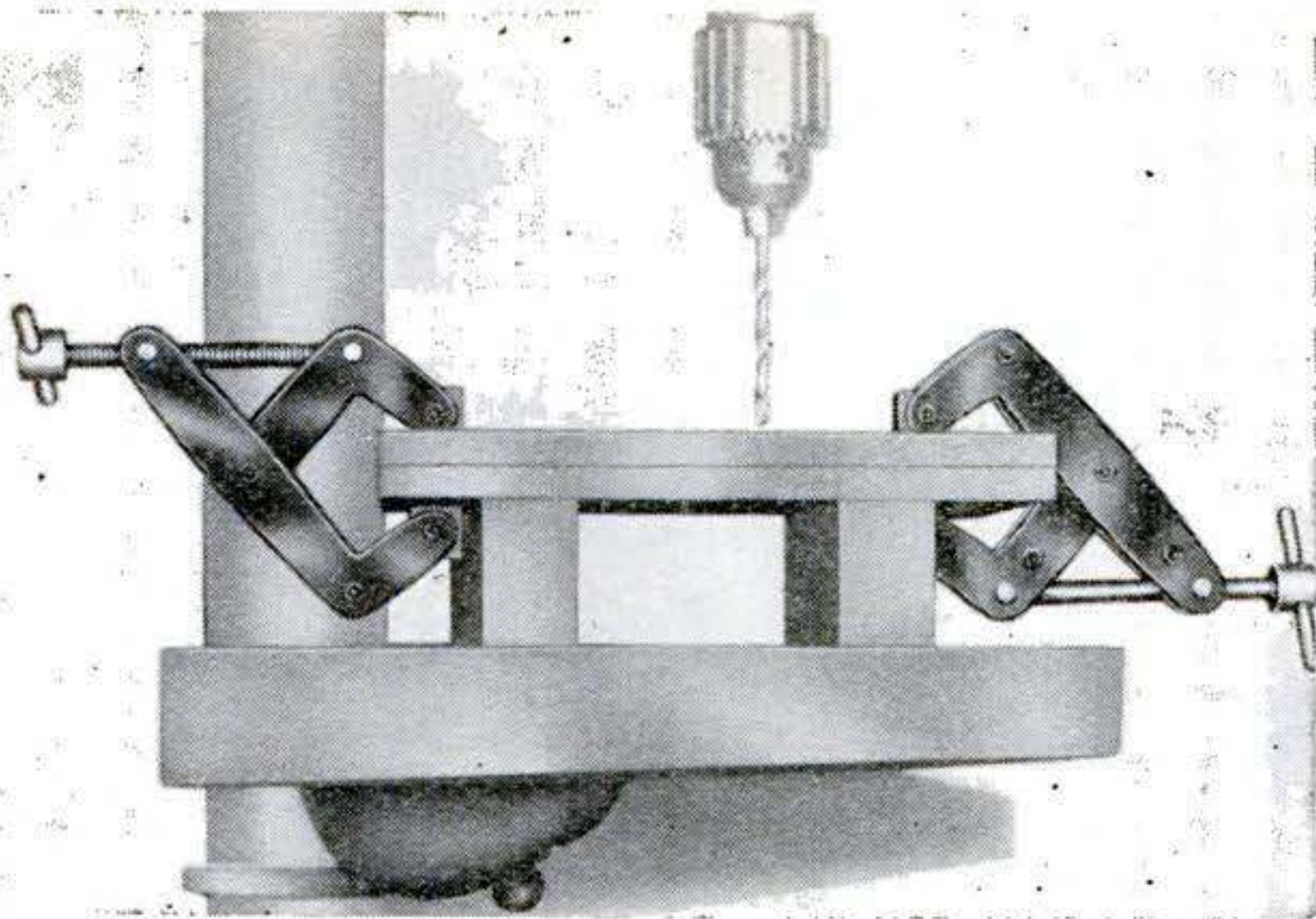


**3 Level-Protractor.** This level also measures slope. It has an adjustable bubble tube with a dial marked to show both angular degrees and the amount of drop in 1/4"-per-foot graduations. The level comes in seven sizes from 24" to 72".



**4 Magnetic Punch.** The base of this punch is a permanent magnet that holds it firmly to the desired point on the work. Lining up the corners or index marks with layout lines insures exact centering. The sides are squared for use with gauge blocks or a straightedge.





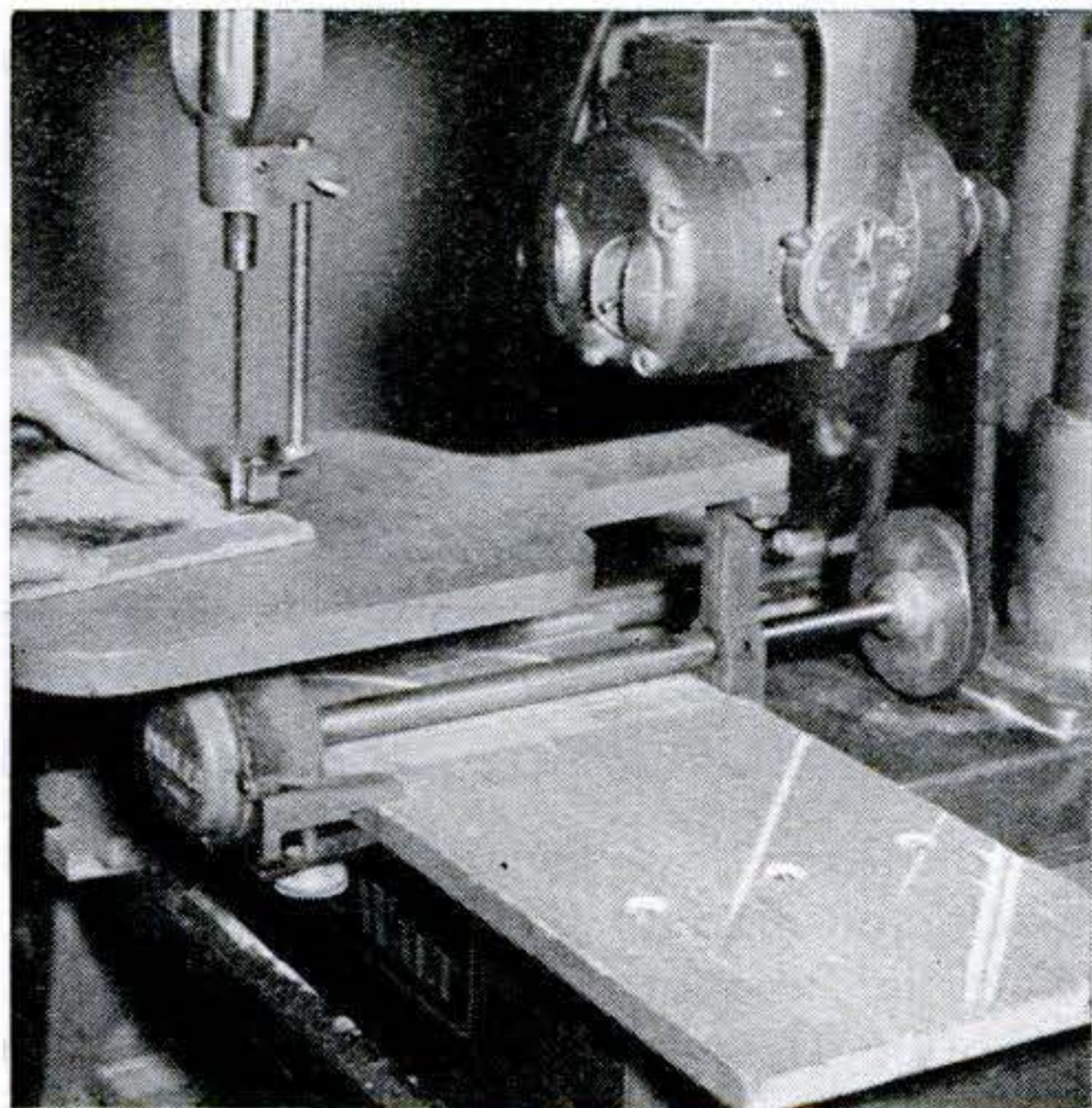
**5 Clamps Won't Twist.** Ball-bearing trunnions in these clamps prevent twisting and distortion. Made of case-hardened steel, the clamps come in five sizes from 1½" to 12". The trunnions also are said to absorb vibration, providing a steady grip.



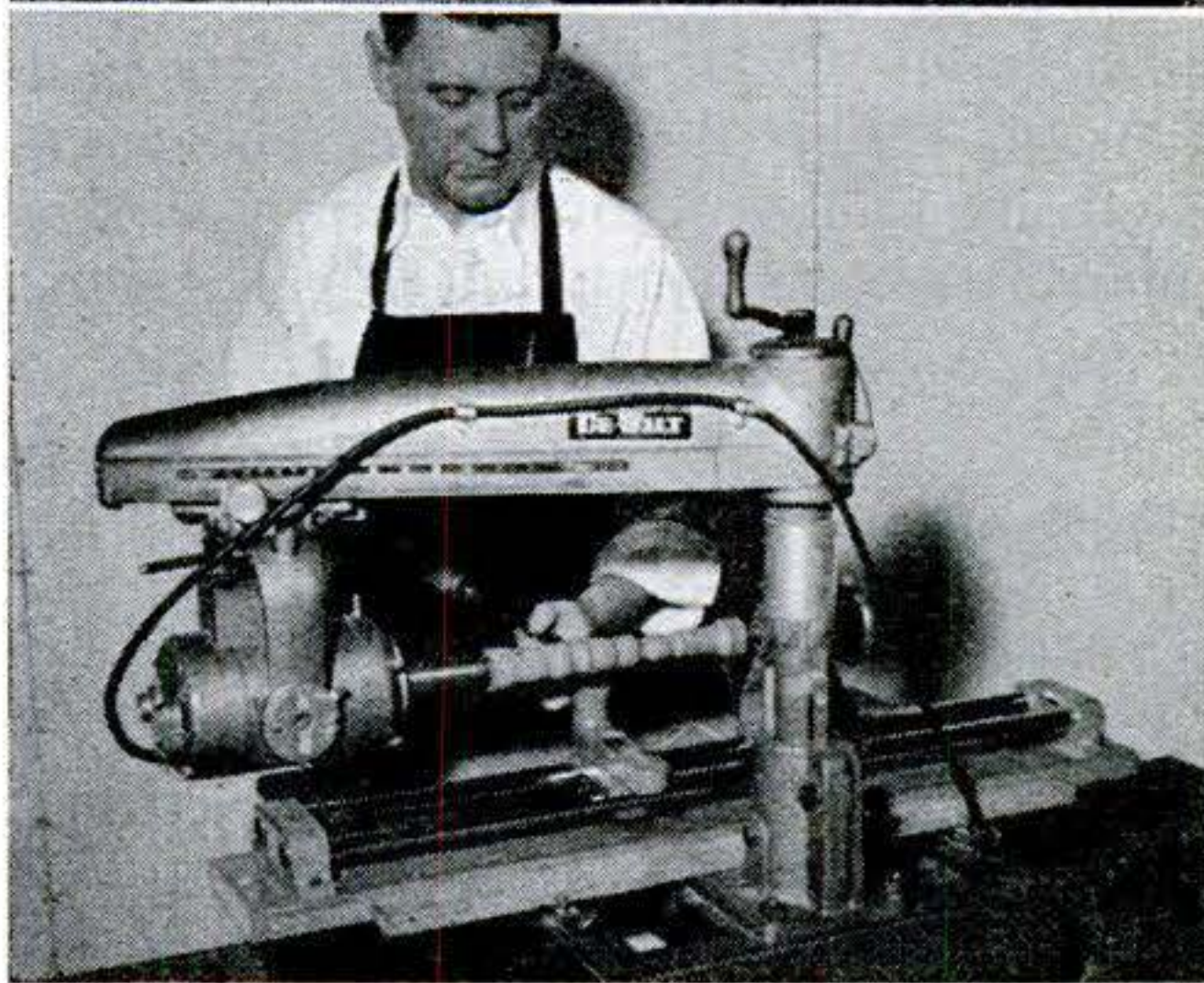
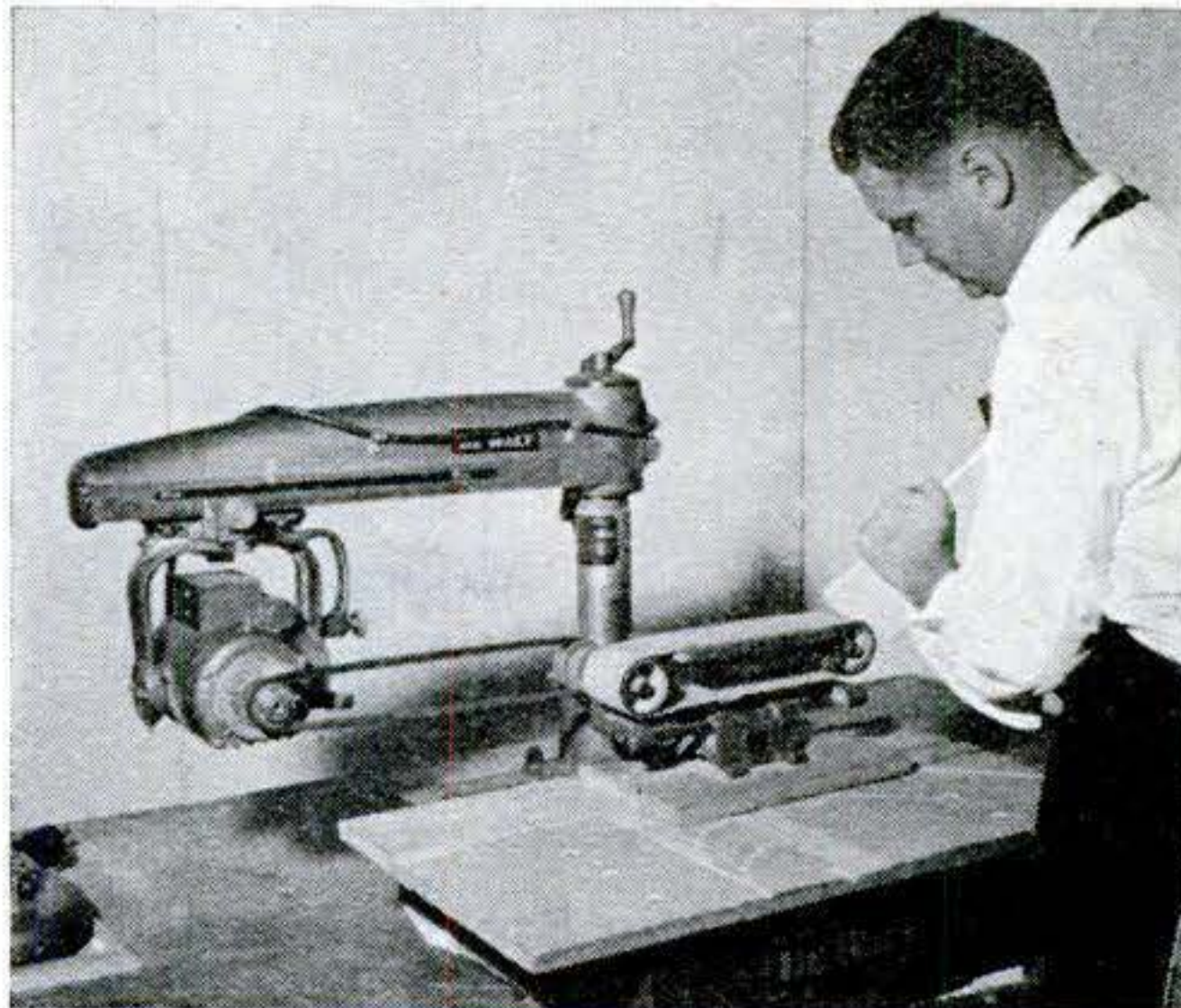
**6 Screwdriver Has Removable Bits.** Four sizes of Phillips bits can be used interchangeably in this screwdriver holder for quick switching from one job to another. The holder also permits easy replacement of worn-out bits with new ones.

*These tools are made by: 1. Syntron Co., 405 Lexington Ave., Homer City, Pa.; 2. Tal Bender, Inc., Milwaukee 2, Wis.; 3. J. H. Scharf Mfg. Co., Omaha, Neb.; 4. Magnet-Hold Perfect Center Punch Co., 837 Central Park Ave., Yonkers 4, N. Y.; 5. Centinela Industrial Supply Co., 11930 Inglewood Ave., Hawthorne, Calif.; 6. Continental Screw Co., New Bedford, Mass.*

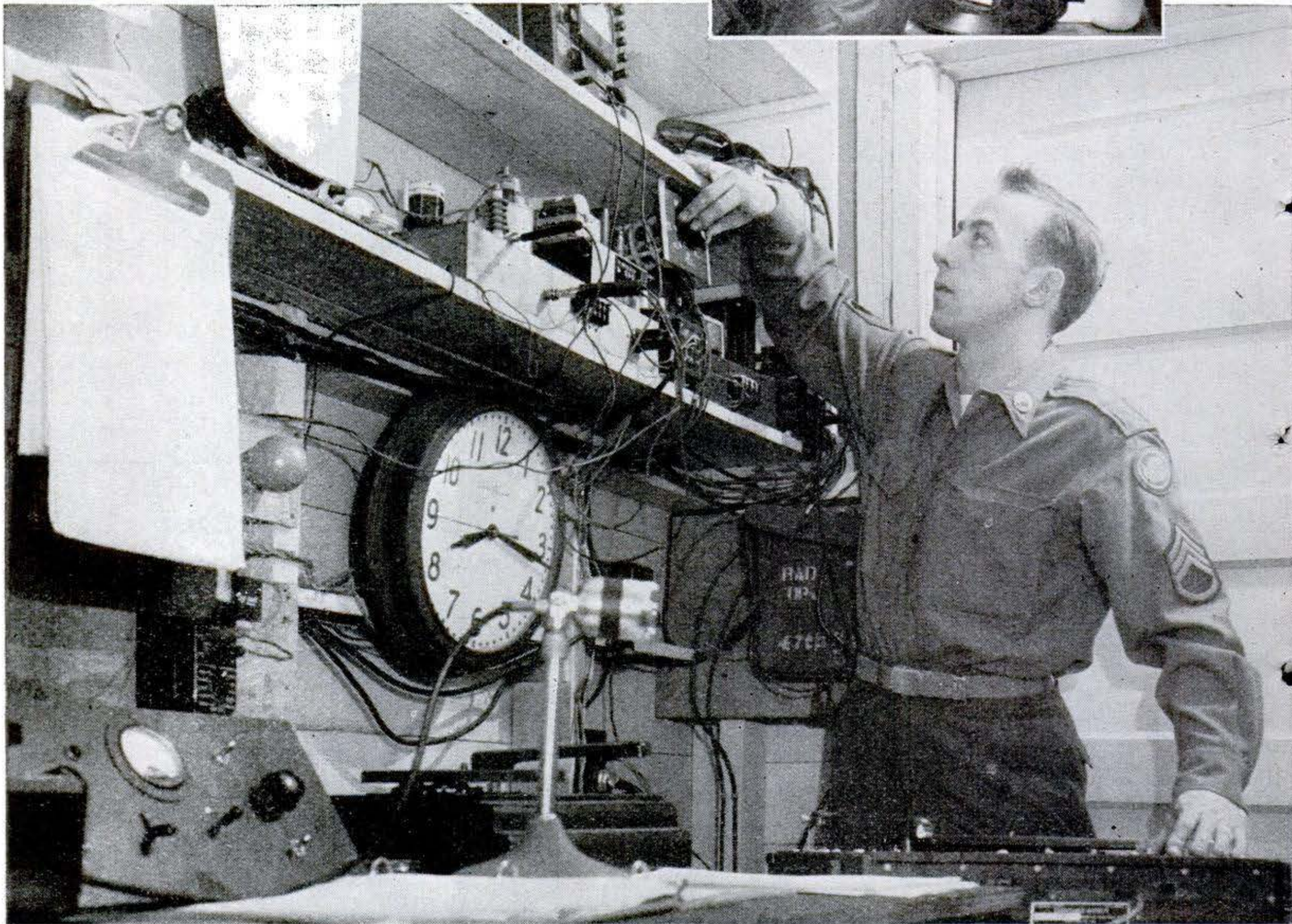
### Attachments Convert Saw to Multi-Purpose Tool



You only need a few feet of bench space to set up this power shop. The basic tool is a radial-arm saw that can be converted with attachments to do several other jobs. Besides jigsawing (above), belt-sanding (right above) and turning (right), the machine will dado, bore holes, shape and joint, rout, surface, grind and cut metal. *DeWalt, Inc., Lancaster, Pa.*

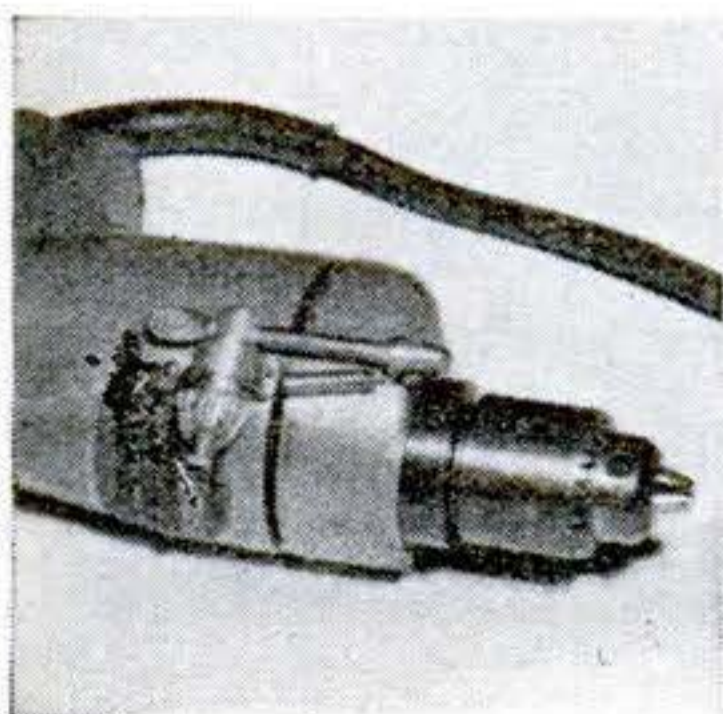


# Craftsmen in Uniform

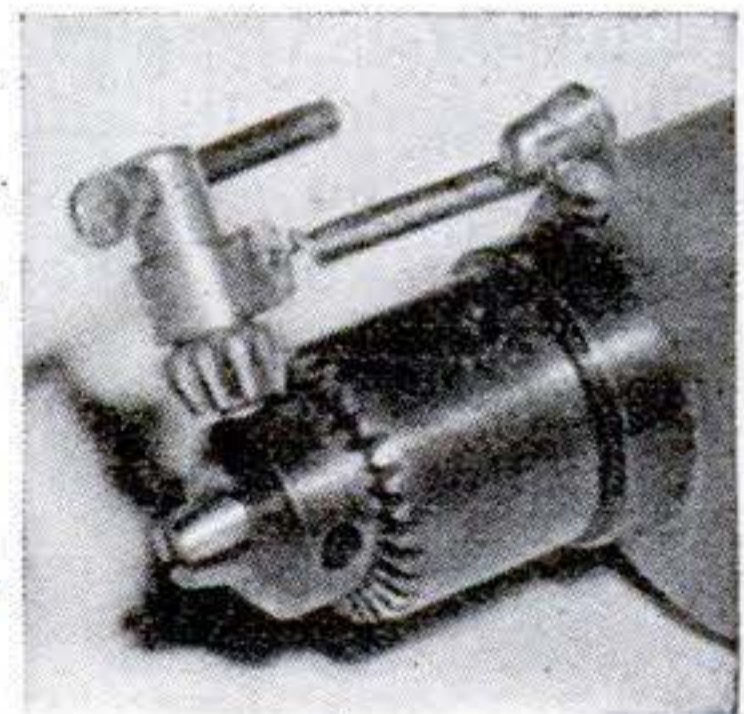


**Soldiers Build Radio Station.** GIs of the 47th Infantry Division pooled bits of equipment to build WVIK, a carrier-current radio station for Camp Rucker, Ala. The camp, located in remote farm country, receives regular broadcasts poorly but WVIK's shows

travel over the electric lines to all parts of the post. Sgt. John Christiansen at the controls (above) and disk-jockey Pfc. Jack Schoppe (inset) are members of a 20-man operating crew that spends free time keeping the station on the air.



**Key Holder for Drill.** The chuck key on this electric drill can never fall off or be lost, thanks to an ingenious holder made by M/Sgt. Raymond Lundgren of the Air Force. As shown at left, the holder folds out of the way when not in use. Lundgren, attached to the 55th Supply Squadron, APO 845, N. Y., points out that a similar holder could be made to fit almost any drill.







**Heads Up.** These busts of a young man and sailor were modeled in clay, finished with bronze paint. The sculptor, Cpl. Isaiah Henderson, wounded in Korea, is a patient at National Naval Medical Center, Bethesda, Md.

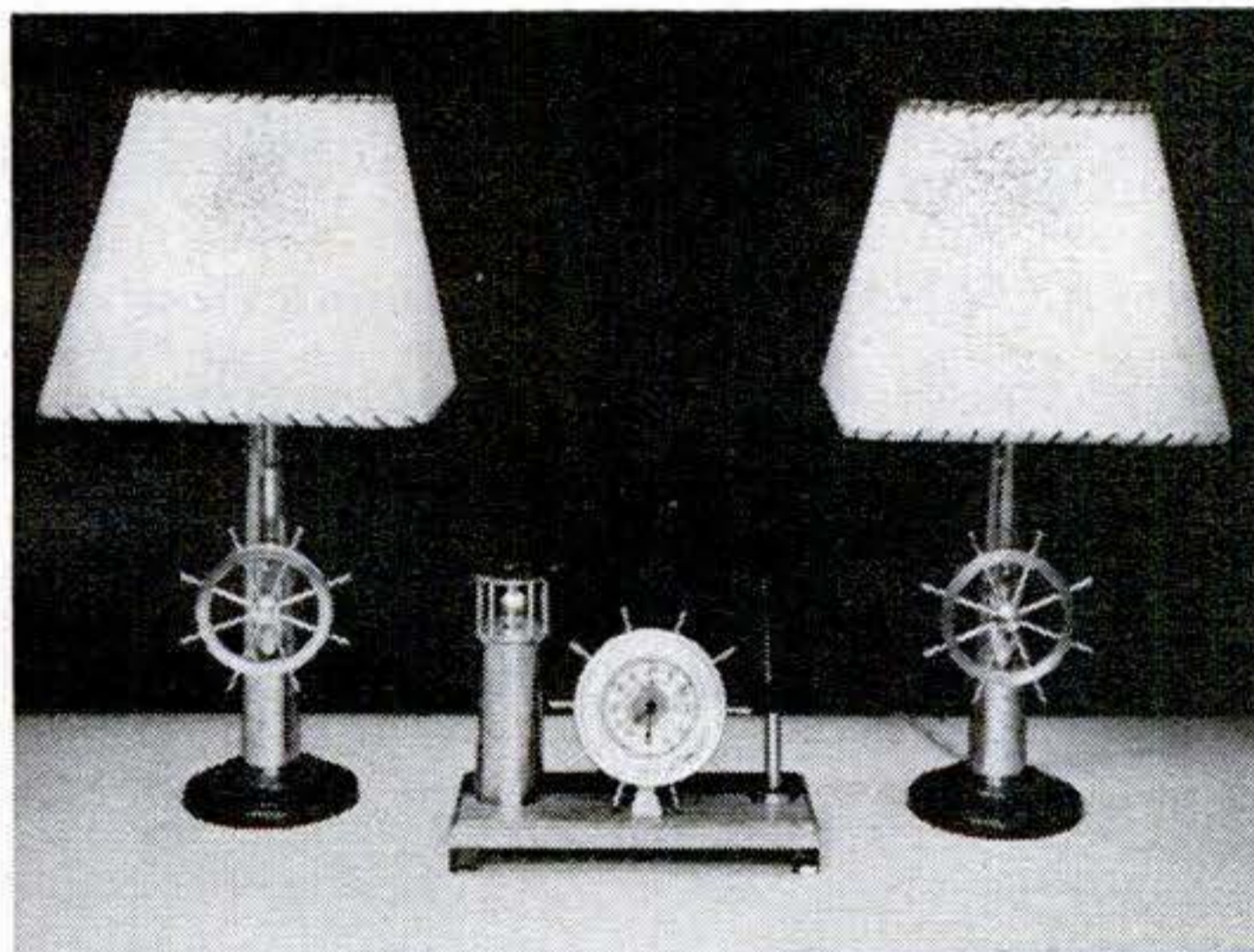


**Flying Pig.** This model of an M-13 aircraft torpedo is scaled 6" to 13½". C. W. Koch, Torpedoman's Mate Second Class, stationed aboard the U.S.S.

*Oriskany*, made it. The head is brass; the body, aluminum.



**Dragon Lamp.** The writhing monster that supports this lamp was carved out of solid mahogany by Seaman R. C. Hafer, Naval Air Station, Patuxent River, Md. The dragon is painted dark oxblood; the frame, black with bright red inner surfaces. The base is natural mahogany. Hafer also made the shade, which is translucent red plastic.



**Seagoing' Desk Set.** This elaborate desk set and the lamps that go with it are the work of George C. Wiggins, Machinist's Mate First Class, of the carrier *Oriskany*. The lamp bases are discarded 40-mm. cartridge cases; the nose replicas are turned from solid stainless steel, with sockets where the fuses would go. The brass wheels on the side, connected by chains to the switches, turn on the lights. In the brass desk set, the lighthouse flashes on when the penholder is pulled forward. Everything was made from scrap metal.

## Craftwork Pays Off for Men in Uniform



POPULAR SCIENCE MONTHLY will pay \$18.75 for every craftwork project by men or women in the armed forces accepted for this department. Send photographs and captions only to Craftsmen-in-Uniform Editor, POPULAR SCIENCE MONTHLY, 353 Fourth Ave., New York 10, N. Y. Although effort will be made to return material accompanied by postage, the editors can assume no responsibility for this.

In addition, the makers of the King Midget automobile, shown above, will send one, to any address in the continental U. S., to the contributor of the most interesting item received before August 1, 1952.

## **They Play Cops-and-Robbers on Wheels**

[Continued from page 76]

simultaneously. Some stopped and compared notes. A few got out and started beating the brush.

We turned down a shadowed drive, then swung around again through a secluded lane with houses on one side and woods on the other. Soon several other mobiles came tearing down after us. Porch lights snapped on as this quiet neighborhood became a scene of confusion.

### **Homeowners Get Excited**

As we jockeyed the car around, a woman flagged us down.

"What's going on?" she cried. "Are you the FBI?"

We reassured her and drove on, leaving her standing beside the road, probably still convinced that we were after a dope ring.

Verne's signal by this time was too loud for us to use our loop but was not blocking our receiver. We tried another tack, and got away from the mob who were searching the alleys and dead-end roads. The signal got stronger.

We pulled up at a boulevard stop and blinked at the blazing neon-lighted avenue.

### **Quarry Is Caught**

"Well, I'll be darned!" exclaimed Earl. "There he is!"

Verne had pulled a wing-ding on us. He'd parked right out in the open—only five blocks from where we had started, near a metal-sided building. Using the building as a reflector, and transmitting with his loop, he had been able to throw his signal into different sections of the city, like dropping basketballs into a hoop from the other end of the court.

Afterwards, when everyone was in, we gathered at a nearby steak house for refreshments and a ham-fest.

Someone consoled the last arrivals by recalling the time when Bob Greer, W7GCT, had operated the hidden transmitter. He had installed a small portable rig on a kiddie car, carried it to the top of Mount Tabor—incidentally, probably the only extinct volcano to be found within U.S. city limits—and concealed himself in a huckleberry patch, with the antenna laid out along the ground. The hams hunted for him half the night on foot, sometimes coming so close he had to whisper into the mike.

END

## **Radar Conquers Huck Finn's River**

[Continued from page 81]

sations. In addition to radar, depth recorders, fingertip controls, radio and a benevolent Government to watch and repair the channel for him, today's pilot enjoys comforts and conveniences that would have made an old-time captain blush. He has Crane plumbing in his private quarters. For every 24 hours he works he is entitled to 12 hours off. After a voyage of 30 days, he goes ashore for 15.

### **Crew Enjoys Air Conditioning and TV**

The crew makes out all right, too. A generation ago, firemen got \$30 a month and they really shoveled coal for their money. Today they tend spotless Diesels, aided by an instrument panel that diagnoses each internal palpitation, for \$225 a month plus vacation time. There are 12 to 16 crewmen on the average tow. They walk on asphalt-tile floors, bathe in tiled showers, listen to the radio and look at television when off watch.

Some of the newest towboats even have air conditioning in the crew's quarters. River water is filtered and purified for drinking. Electricity on the modern tow preserves the food, does the laundry, purifies the water, operates capstans, runs a speaker system by which the captain communicates with the crew, and powers the radar.

### **The River Is Really Humming Now**

All these refinements and mechanized aids point to a new era of bustling activity and expanding traffic along the great central artery of the United States. Last year the Mississippi from the Ohio north carried nearly four billion ton-miles of freight—30 times as much as 20 years ago and immeasurably more than the paddle-wheelers ever handled, even when they hit their high-water mark before the Civil War.

The rip-roaring, boiler-busting, whistle-tooting heyday of Mississippi steamboatin' is gone forever, but Old Man River still keeps rolling along. And he's in big business now.

END

**Next Month: Popular Science Monthly will tell you how the Air Force trains the flying radar observers who patrol the nation's inner defenses by night and day and in all kinds of weather, protecting strategic centers against hostile attack.**



## PERFECTION IS HIS STANDARD...

Like you, he recognizes no compromise with perfection ... accepts only one quality of materials, workmanship, tools. You gauge the work of others by your own rigid standard and are proud to have others measure up to it.

Bonney wrenches are made to the same standard of perfection. That is why mechanics call them America's finest—unmatched for lightness, strength, balance, and precision.

Bonney wrenches are the pride of the men who make them ... the pride of the men who use them.

**BONNEY FORGE & TOOL WORKS**  
Allentown, Pennsylvania



Perfection is the standard of the men who design and build America's Diesel engines ... power plants carrying names like Baldwin, Cummins, American Locomotive, Fairbanks Morse, Hercules, Ingersoll-Rand, Worthington, General Electric, that set new standards of performance in automotive, railroad, marine, and industrial service.

# FRAM FILTERS

## TRAP MORE DIRT



## Keep Engines Clean

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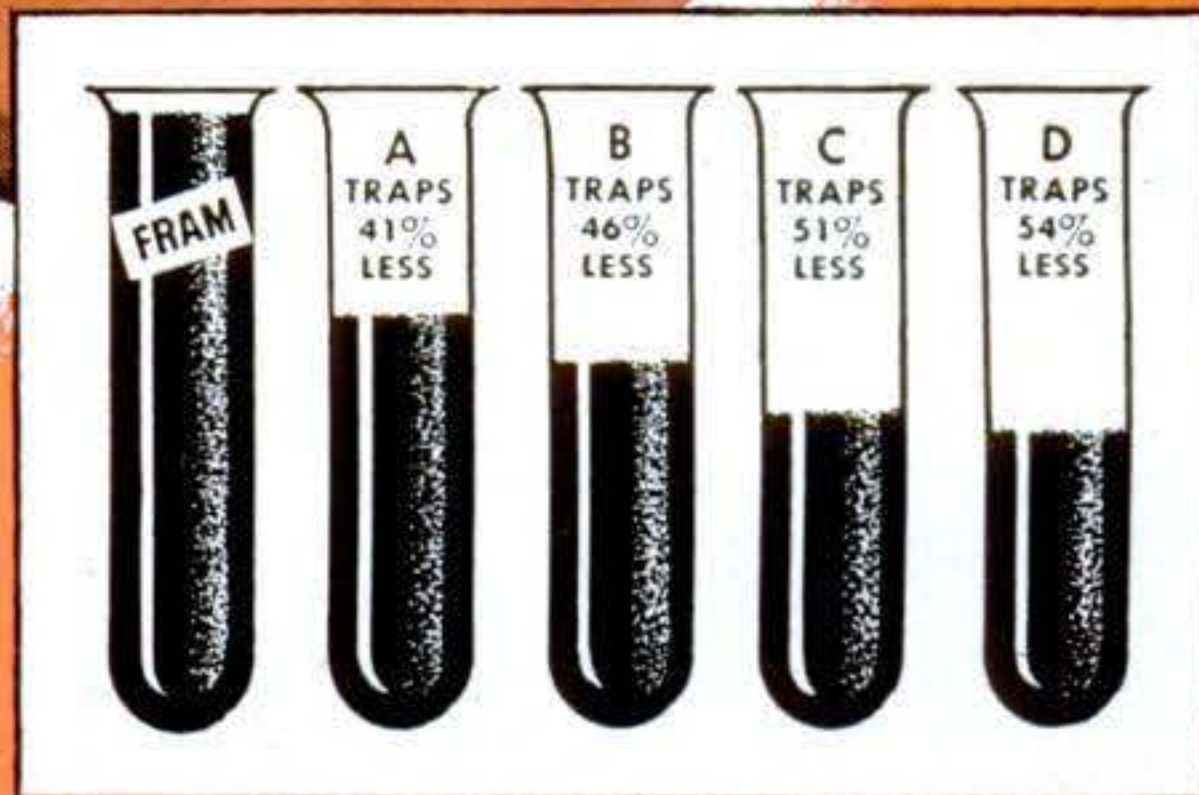
You get the best protection money can buy when you insist on Fram Oil Filter Cartridges. That's because Fram Cartridges are *custom-engineered for your car!* Fram traps engine-killing dirt, dust, grit, sludge and abrasives . . . helps keep your car on the road instead of in the repair shop!

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### TESTS PROVE FRAM IS BEST!

The chart above shows the results of scientific tests conducted under precise laboratory conditions...proving Fram traps more dirt, gets oil *cleaner*, cleans it *faster* and keeps it clean *longer* than any cartridge tested!

# FRAM

OIL • AIR • FUEL • WATER

# FILTERS

## Gus Warms Up a Road Racer

(Continued from page 170)

"I'll drive carefully, old boy," Pinkerton added. "And the delay might be dangerous too, you know."

Against his better judgment, Gus gave in. They eased the injured man into the car. Gus unsnapped the cover over the luggage deck and knelt sideways in the narrow space. Pinkerton turned the car around and started back toward town.

### Gus Gets an Idea

"You were on your way to compete in the races?" Pinkerton asked the girl.

"Yes. We were headed there when the accident happened. My name is Lindy Walton. . . Can't we hurry?"

Pinkerton let it out gradually to 60 and held it there. Gus leaned low over the back of the seat and concentrated on the instrument panel. Oil pressure, 30 pounds. Temperature, 174°. Oil pressure, temperature. . . . All of a sudden he had an idea.

The familiar brick walls of the hospital came into view. Pinkerton rolled to a stop at the emergency entrance and they carried the injured man inside.

The nurse checked the pupils of his eyes and his pulse while Lindy explained what had happened. Then two attendants wheeled him down the hall.

### Nurse's Report Comforts Lindy

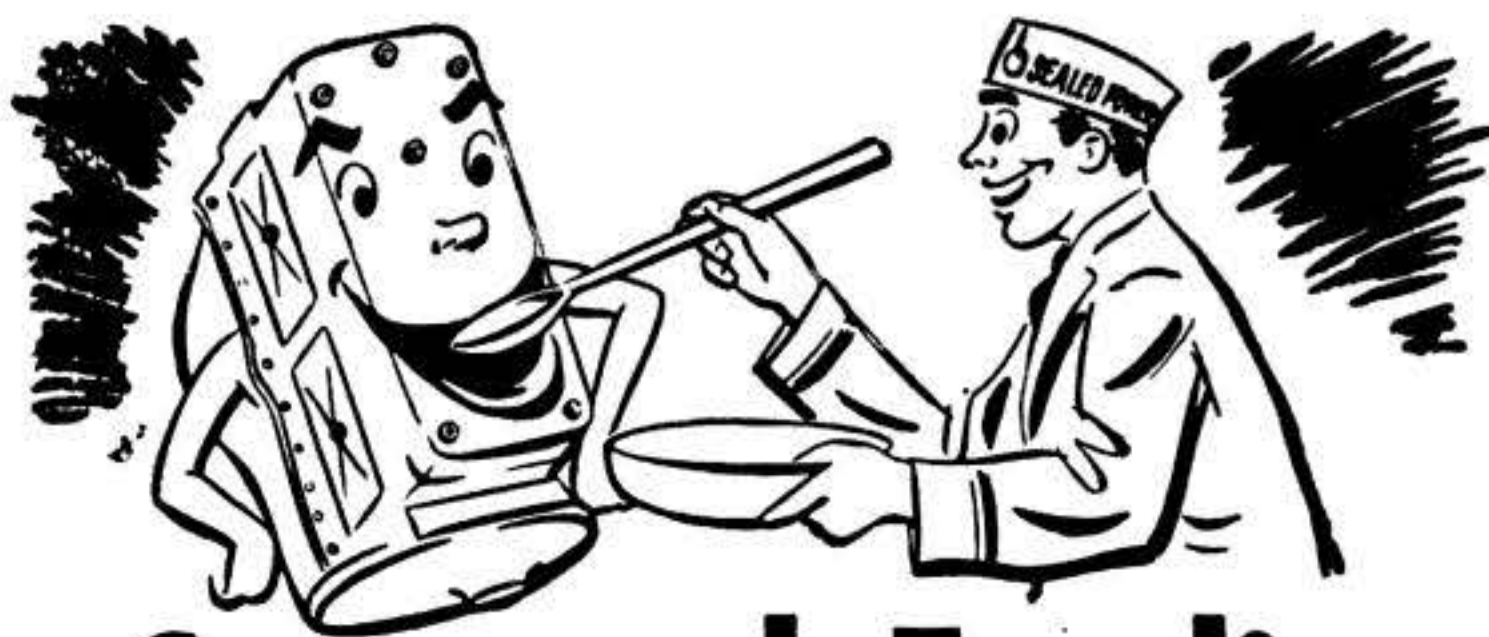
"Dr. Barton will look him over right away." The nurse put a reassuring hand on the girl's arm. "I'm pretty sure he's not seriously hurt. We'd better have the doctor check you over too, young lady. Meanwhile, try to relax. It won't be long."

Gus and Pinkerton sat with Lindy in tense silence as the wall clock measured the slow minutes. Then footsteps along the corridor, and Dr. Barton, white-haired and brisk, walked in. "He's all right—just shaken up. Better leave him here for a few days." He smiled at Lindy. "Your brother has come around and he seems quite concerned about something—you'll probably understand. He said, 'Tell Lindy to let me know who wins.'"

Lindy laughed in sudden relief. "Oh, yes, yes, I know what he meant. And thank you so much, Doctor." She turned to Gus and the Englishman. "You've both been wonderful. I can't tell you how much I—"

Pinkerton harrumphed politely and Gus said they were glad they had come along

[Continued on page 222]

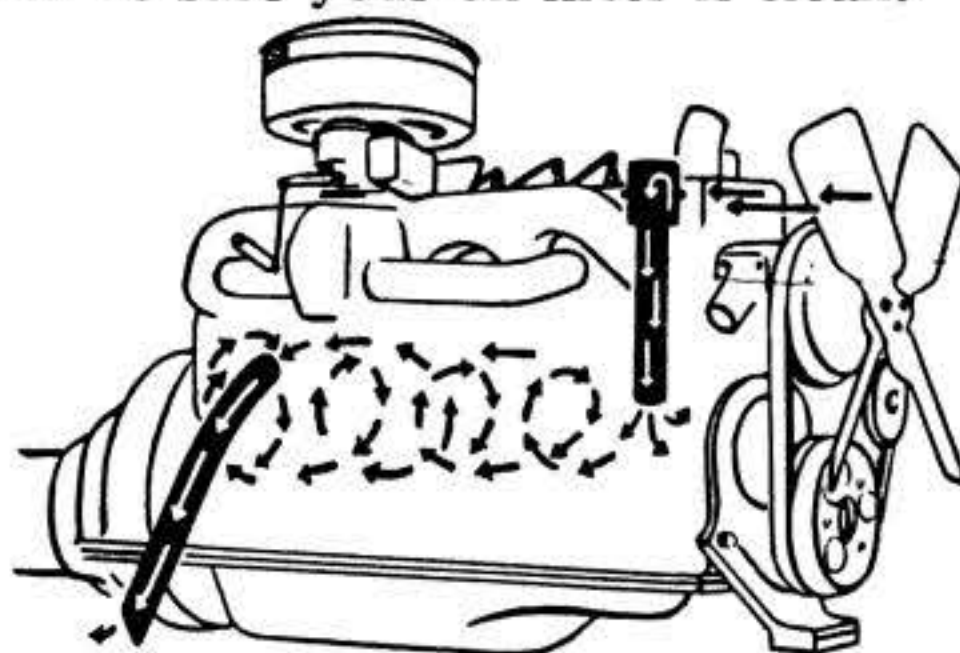


# Care and Feeding of Engines

BY S. P. CORP

## VACATION FUN INSURANCE

To insure *maximum* fun on your vacation motor trip, take time out to insure *minimum* car trouble. Have your engine tuned up. Get a thorough chassis lubrication job. Don't forget front and rear wheel bearings—they are not part of a regular chassis lube job, and can easily be overlooked too long. Change engine oil and be sure your oil filter is clean.



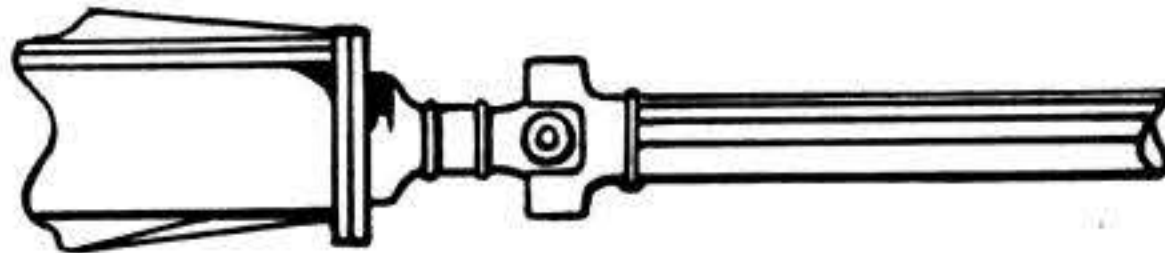
Clean the gauze filter element in the top of your oil filler cap by washing it in kerosene, so the crankcase can breathe. Choked-up breathing

here can cause crankcase dilution and poor oil mileage.

At the right rear of your engine, sometimes connected to the valve cover plate, you will find a one-inch air-outlet pipe. Check tapered lower end, which should open to the rear, to make sure it is not bent or damaged. If bent, straighten it, as the vacuum created by this taper is an important factor in proper crankcase breathing. If this pipe has a gauze filter at the top, clean it with kerosene.

## UNIVERSAL JOINT

Every 20,000 to 30,000 miles, universal joints require lubrication. This calls for disassembling of the unit and thorough cleaning, after which high-melting-point wheel-bearing lubricant is added. It is a puttery, detailed job, but means saving a lot of money on costly repairs later. If you don't *know* it has been done recently, be sure to do it before starting that vacation trip!



## LATE-MODEL CARS AND TRUCKS...

... operate at higher engine speeds, higher compressions, higher combustion temperatures. That's plenty of punishment for piston rings, and new Sealed Power KromeX Ring Sets can take it! Top compression ring and steel rails of MD-50 Steel Oil Ring have chrome faces to fight heat, friction, abrasion and corrosion. Write Dept. H-6, Sealed Power Corp., Muskegon, Mich., for your free copy of new illustrated booklet, "More Power, Less Oil, Less Gas."





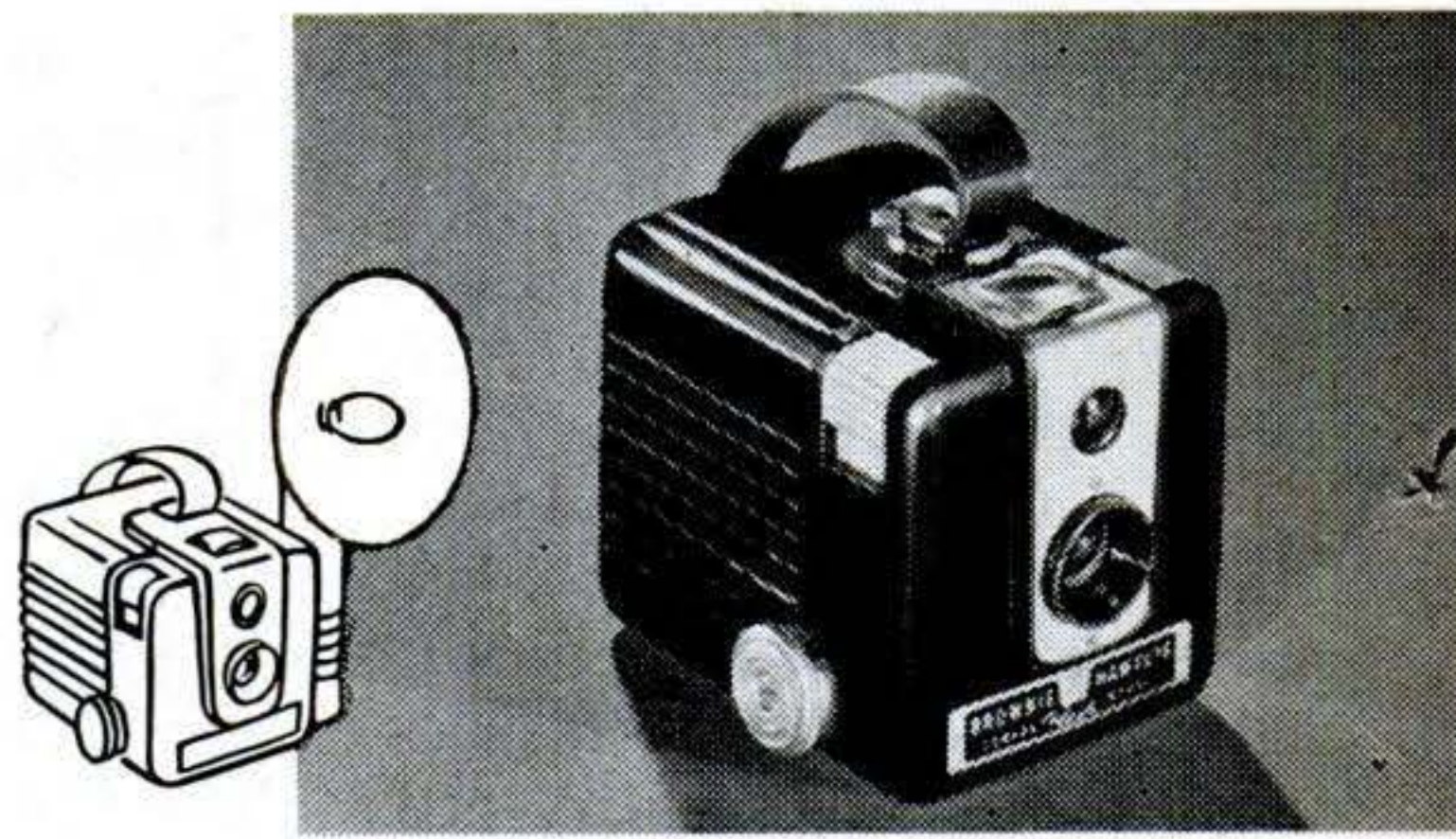
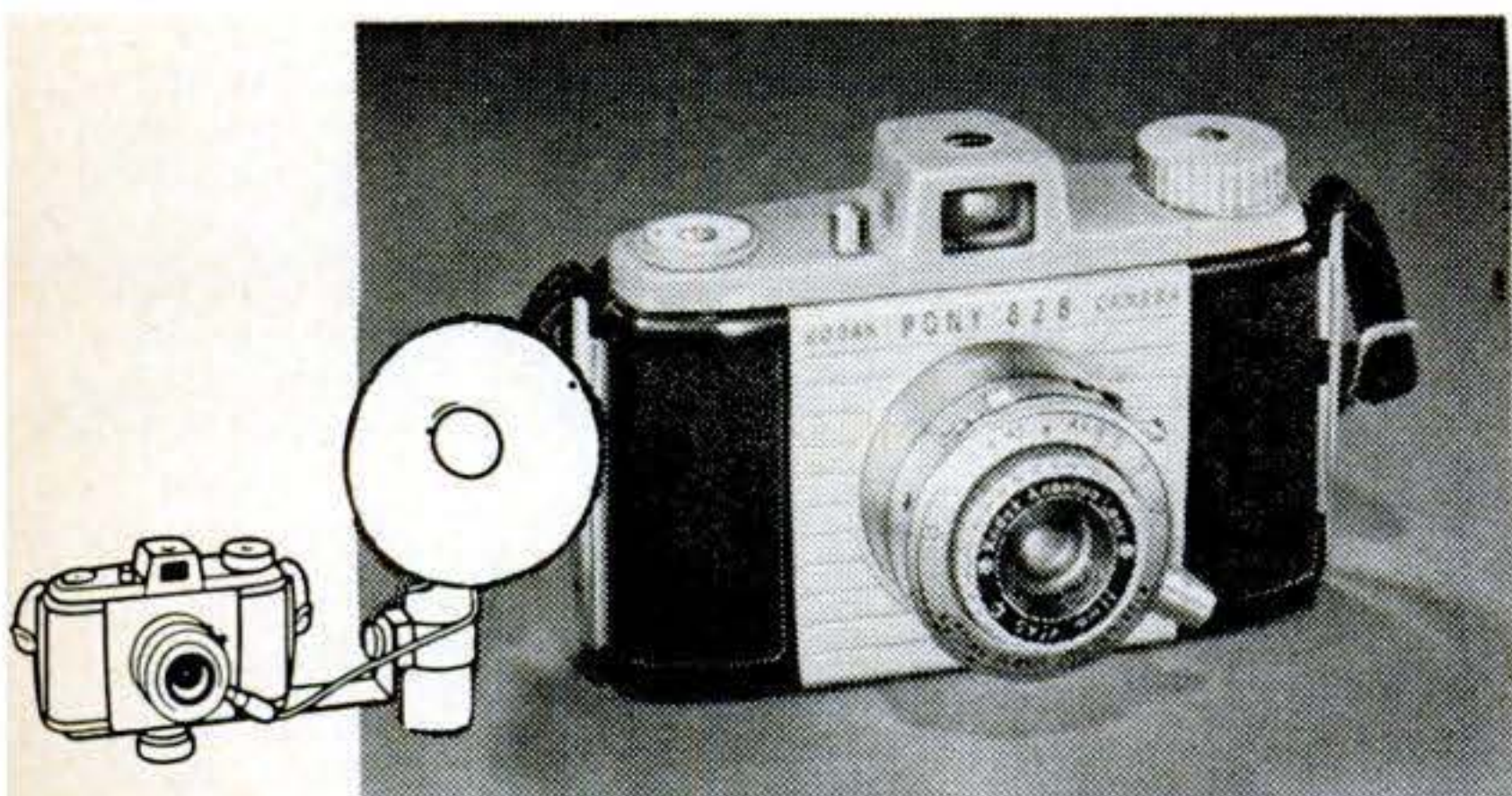
# For more fun at Camp-

Take pictures on sunny days...  
develop and print 'em on rainy days

**The Boy Scouts' motto is: "Be Prepared."** That's a good motto for you, too, on your next camping trip—and for your children when they pack off for summer camp.

Be prepared to add to all the fun with some of the picture-taking "gear" you see

on these two pages. The cost is really little when you consider how rewarding snapshots can be. There's no better way to bring back memories of happy days. Your Kodak dealer will be glad to help you choose the right equipment.



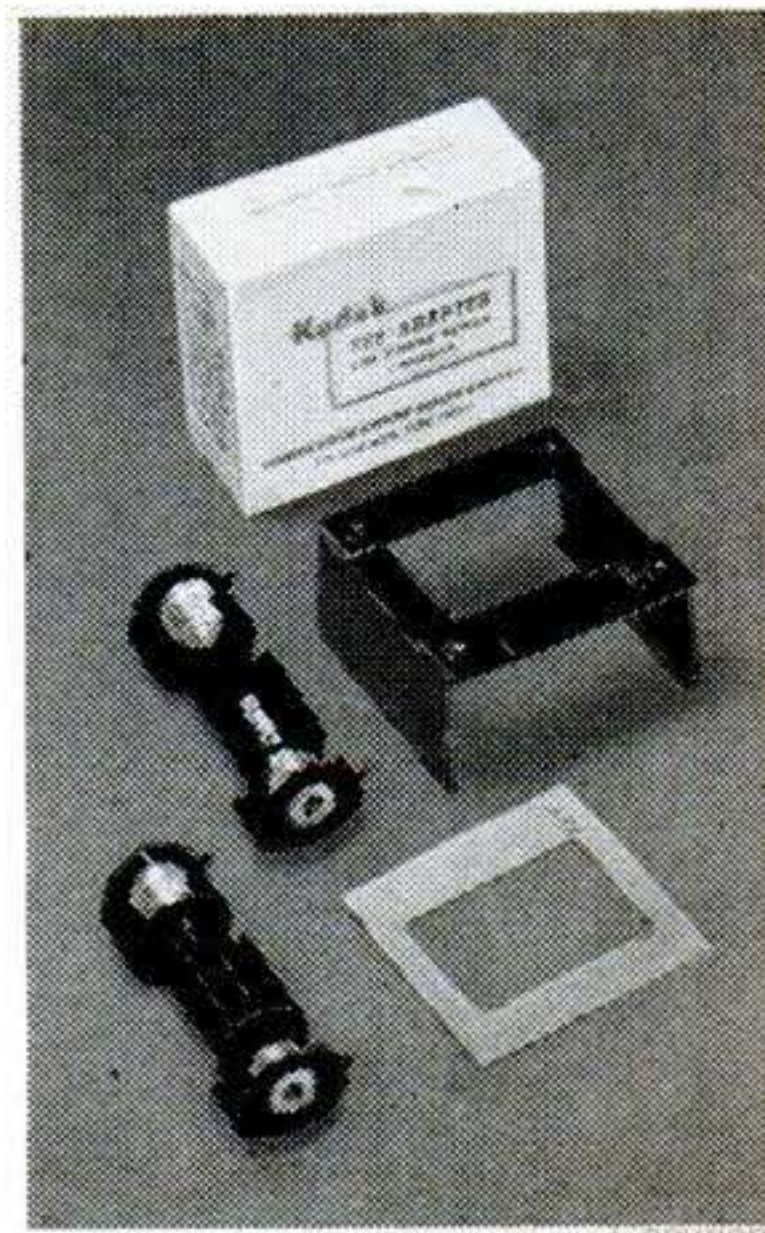
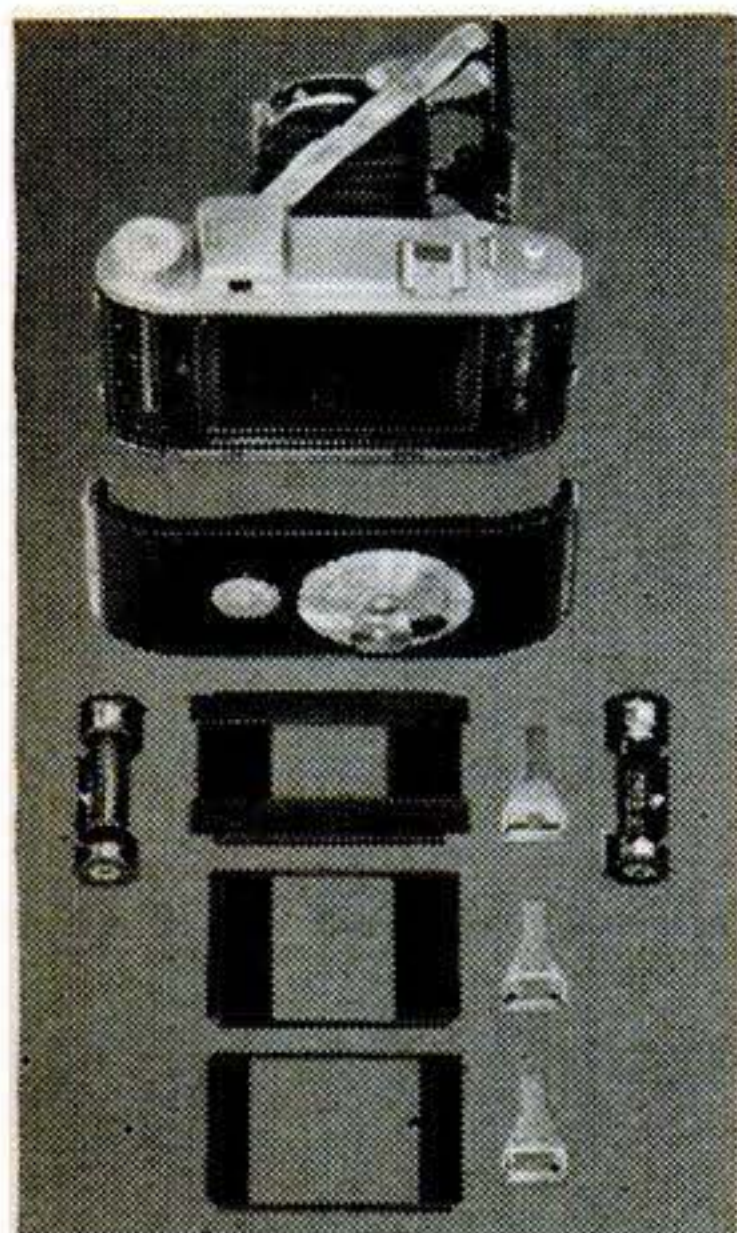
**Modestly priced small cameras—superb for color—**The famous Kodak Pony 828 Camera is a lightweight, thrifty "miniature." Makes superb color slides on Kodachrome Film, sharp black-and-white negatives that enlarge beautifully . . . Kodacolor snapshots, too. Kodak Anaston *f/4.5 Lumenized Lens*; Kodak Flash 200 Shutter with built-in "synch"; simplified settings marked in red. Takes 8-exposure rolls. Only \$31.15. "Pony 135" for 20- or 36-exposure 35mm. films has automatic film-stop and exposure counter—\$35.75. For flash shots any time, anywhere—Kodak Flashholder fits both cameras. \$10.55.

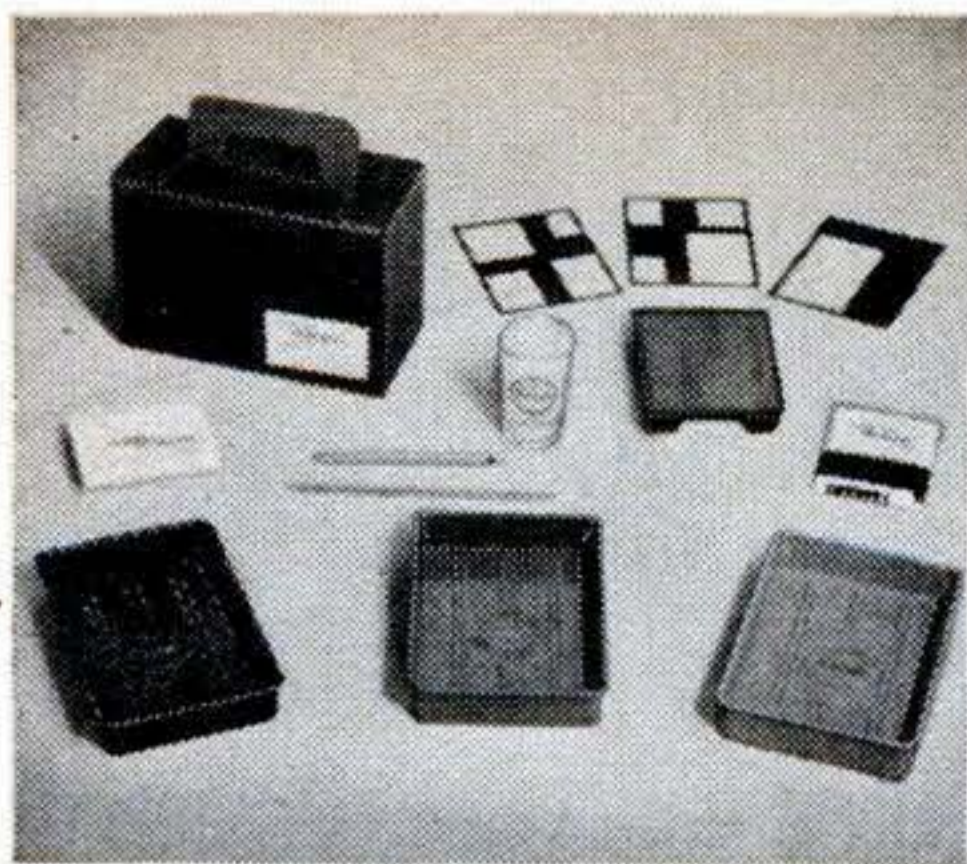
**Rough-and-ready camera for youngsters—**The inexpensive Brownie Hawkeye Camera, Flash Model, has up-to-the-minute styling. Simple to operate; no adjustments, just aim and shoot. Oversize view finder shows picture subject big and clear. Takes 12 snapshots on a roll of black-and-white or Kodacolor Film. \$7.20. The Kodalite Flashholder attaches easily for flash pictures night or day, indoors or out. \$3.39.

**For protecting your camera—a Kodak carrying case** is a smart idea. The handsome, top-grain leather Kodak Field Case for Kodak Pony 828 Camera (right) opens in an instant. \$7. Your Kodak dealer has a protective case for practically any camera.



**Adapter kits permit Kodak Tourist and Reflex Cameras to use Kodachrome Film—**The Kodak Tourist Adapter Kit (left) for deluxe model Kodak Tourist Cameras permits color shots on Kodachrome 828 Film (for 2x2-inch slides), also economical half and square pictures on all Kodak 620 films. \$13.25. The 828 Adapter for Kodak Reflex Cameras (right) permits use of Bantam-size films—both color and black-and-white. \$4.59. Both kits include back-frame and viewfinder masks, and special spool baskets.





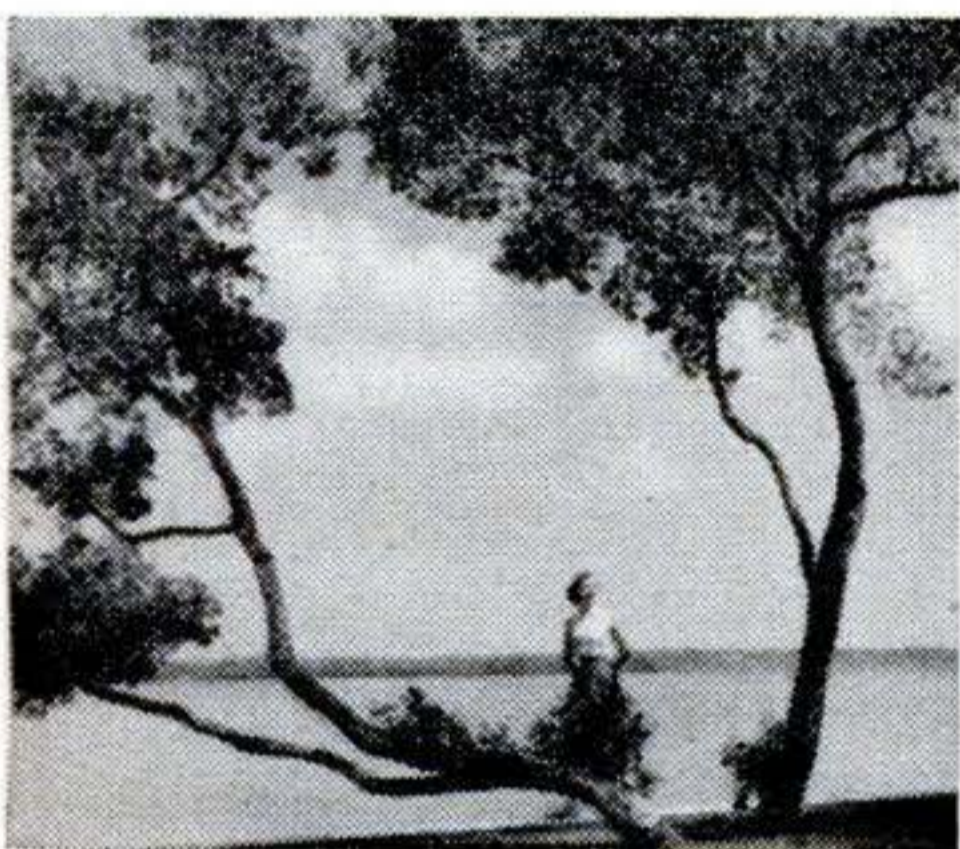
**Perfect for the beginner**—The Kodacraft Printing Kit contains easy-to-use materials for printing your own pictures. Includes trays, printing frame, graduate, thermometer, stirring rod, Kodak Velite Paper for printing in daylight. \$4.30.



**Everything you need to develop and print pictures**—The Kodacraft Photo-Lab Outfit includes new Kodacraft Roll-Film Tank; Kodacraft Printing Frame; trays; Kodak Velite Paper; chemicals; graduate; thermometer; and film clips. \$7.45.



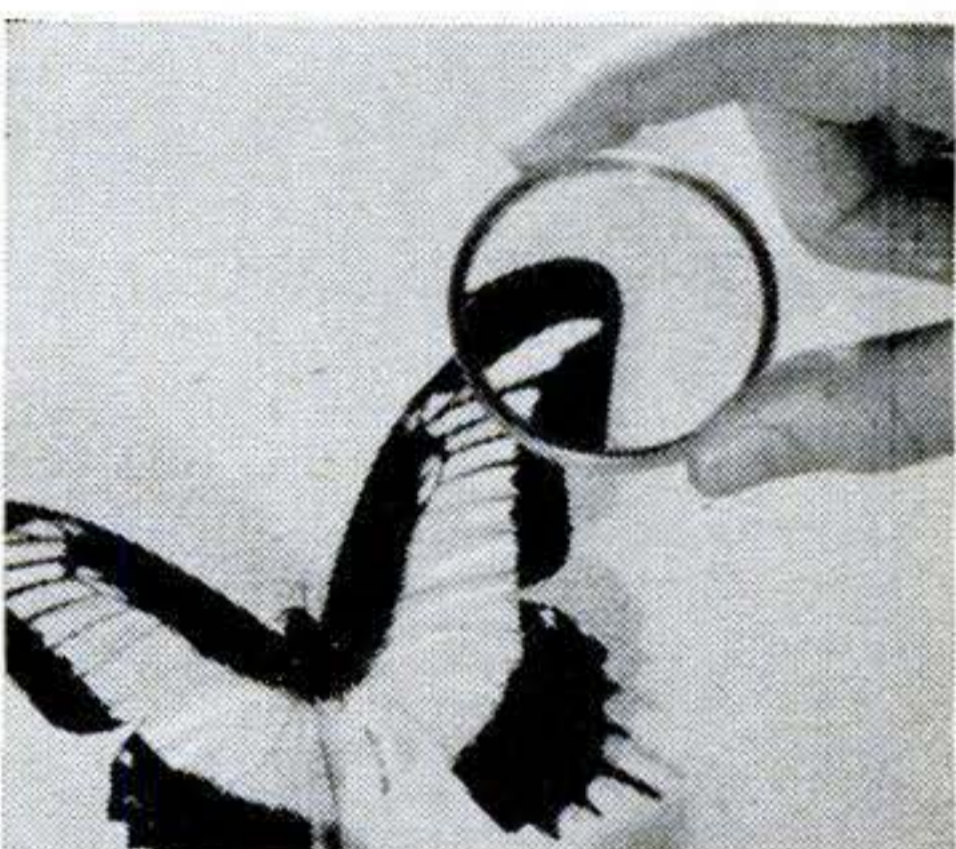
**This advanced outfit includes a metal printer**—The Kodacraft Advanced Photo-Lab packs neatly into the Kodacraft Metal Printer. Contains all materials for developing, printing pictures, including a Brownie Darkroom Lamp, Model B. \$12.10.



**To put snap in your snapshots**—Medium yellow Kodak Wratten Filter K2 darkens blue skies and emphasizes clouds. From \$1.65. And with inexpensive cameras, a Kodak Cloud Filter brings out clouds in true contrast. \$1.72.



**To warm up your distant color shots, Kodak Skylight Filter**—Reduces bluish cast in distant scenes. Use it to get warmer-tone pictures of mountains, seascapes . . . pictures in open shade under clear sky and on overcast days. From \$1.65.



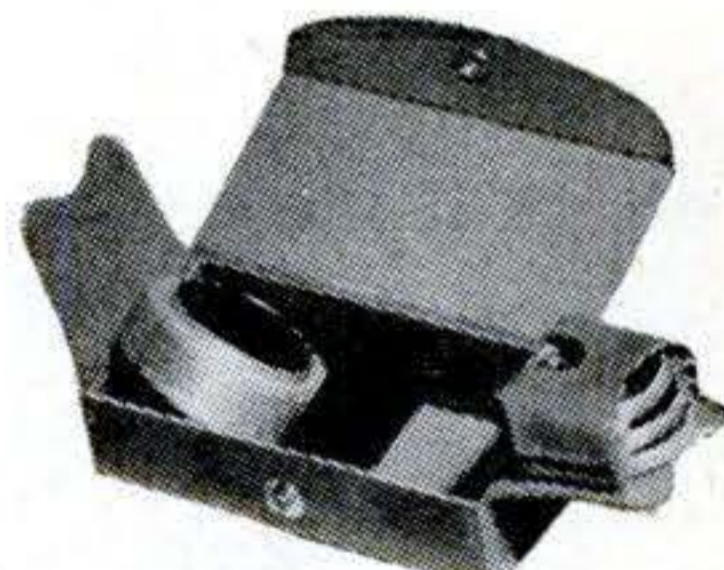
**For nature study shots**—A Kodak Close-up Attachment enables you to "shoot" at closer range than is normally possible with a simple camera. Gets big, sharp images of flowers and small still-life subjects. Any size, \$1.63.



**Get in the picture yourself**—Attach the Kodak Auto-Release to any camera which has a cable release . . . set it . . . you have 10 seconds before the shutter clicks. \$3.86 (cable release not included).



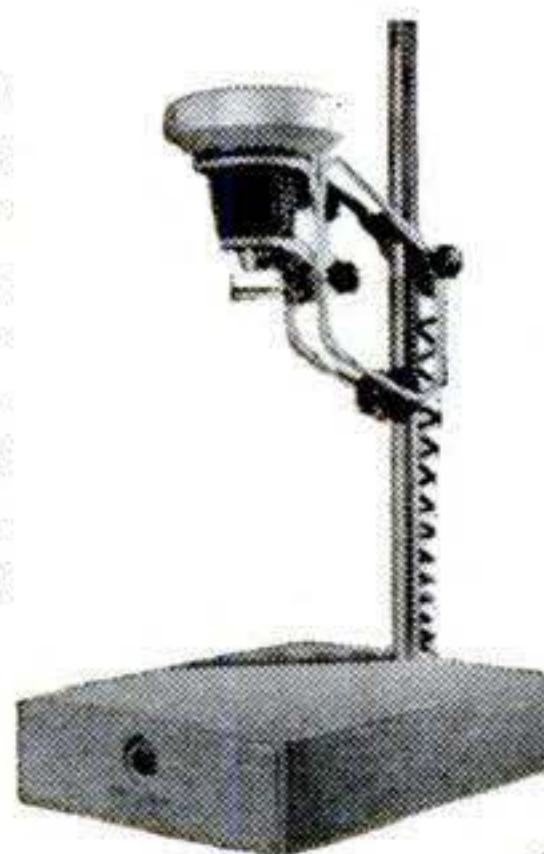
**Shade the eye of your camera**—A Kodak Lens Hood helps to guard against direct sunlight striking your lens. Also reduces sky "flare" when pictures are side-lighted by sun or photo lamps. From \$1.65.



**Keep your filters protected and ready for action**—Kodak Combination Filter Cases are made of durable leather. Hold a Kodak Adapter Ring, Lens Hood, and four filters. Series V, \$4.25; Series VI, \$4.95.



**And when you get home**—you'll surely want to make enlargements from your choice negatives. The Kodak Hobbyist Enlarger (left) is only \$44 complete with lens. "Cold" light protects negatives . . . new negative carrier simplifies loading, takes negative sizes through 2 1/4" x 3 1/4". The Kodak Fluro-lite Enlarger (right) has "cold" light illumination . . . rotary negative carrier for easy loading . . . lighttight cabinet in base for paper storage. \$99.50 (without lens).



*Prices subject to change without notice and include Federal Tax where applicable*

**Your Kodak dealer will be glad to demonstrate this equipment for you—see him for all your photo needs.**

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SANDING**



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flat surfaces



Levels glued,  
butt, miter joints



Chamfers edges—  
fits frames



Sands large areas  
at high speed

**Gus Warms Up a Road Racer**

(Continued from page 219)

when they did. "I'll let you know about the race," he grinned, "just as soon as I can."

When they got back to the car, Gus checked his watch. Eight-thirty.

"I thought of something when we were on the road. Let's get back to the garage."

**MG Starts Doing a Rumba**

Pinkerton tugged at the starter pull. The engine caught, rose to idling speed and then fell into a rumba-like hit-and-miss rhythm. "I never thought I'd be glad to hear *that*."

Gus lifted the hood and listened. "What's normal oil pressure in this car?"

"Around 60. This type of oil filter doesn't have a by-pass to keep pressure up when it becomes congested. Mine is overdue to be changed. The dealer in Long Island was out of them, but he said 30 pounds was safe enough for the race."

Gus cocked his ear at one carburetor and then the other. "Listen to the rear one."

Pinkerton leaned down and put his ear close. "Slight whistling noise."

"That's your trouble. Right behind the carburetor. It's your intake manifold. Come on, we'll get you in that race yet."

**Gus Diagnoses the Ailment**

Pinkerton rapped it through town while Gus explained.

"Back on the road, I got to thinking about overheating in engines. The fact that your oil filter needs changing, plus that small hose leak, has made your engine run warmer than it normally should. Every time you get caught in slow-moving traffic, or do any hilly driving in low gear, the temperature is naturally going to go up. It rises sharply when you turn the motor off, because the water and oil that cool the engine aren't moving. Now, overheating doesn't necessarily do any harm, and there's always heat expansion in most parts of a motor. But in this case, the soft metal of your intake manifold didn't expand uniformly. It warped slightly and started sucking air. That weakens your mixture in that carburetor, throwing it out of tune with the other, and the engine runs rough."

"Why doesn't it run rough all the time then?"

"Well, the thing isn't badly warped yet, and the gasket takes care of it as long as the engine is running at a fairly cool tem-

[Continued on page 224]

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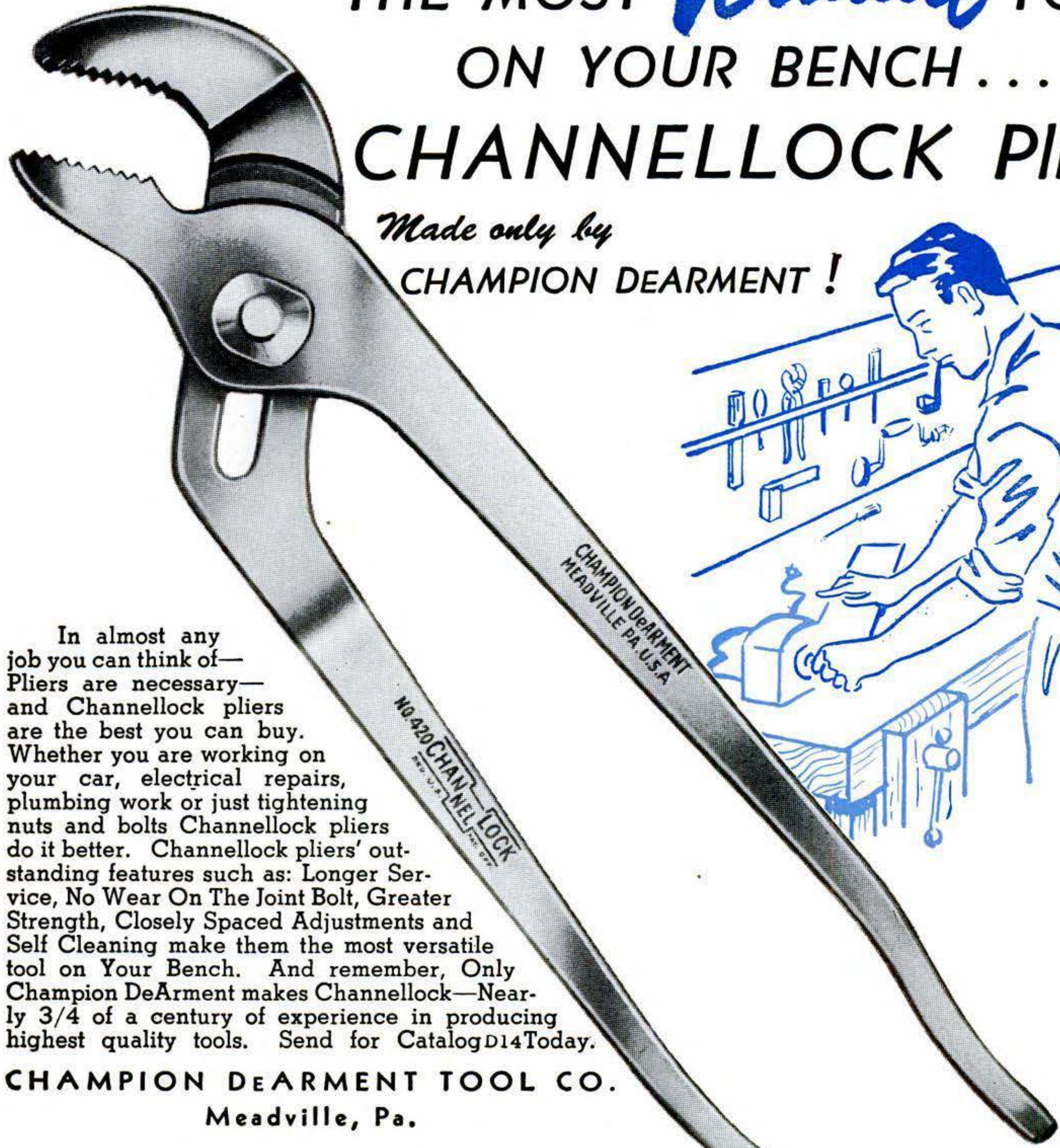
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THE MOST *Versatile* TOOL  
ON YOUR BENCH...

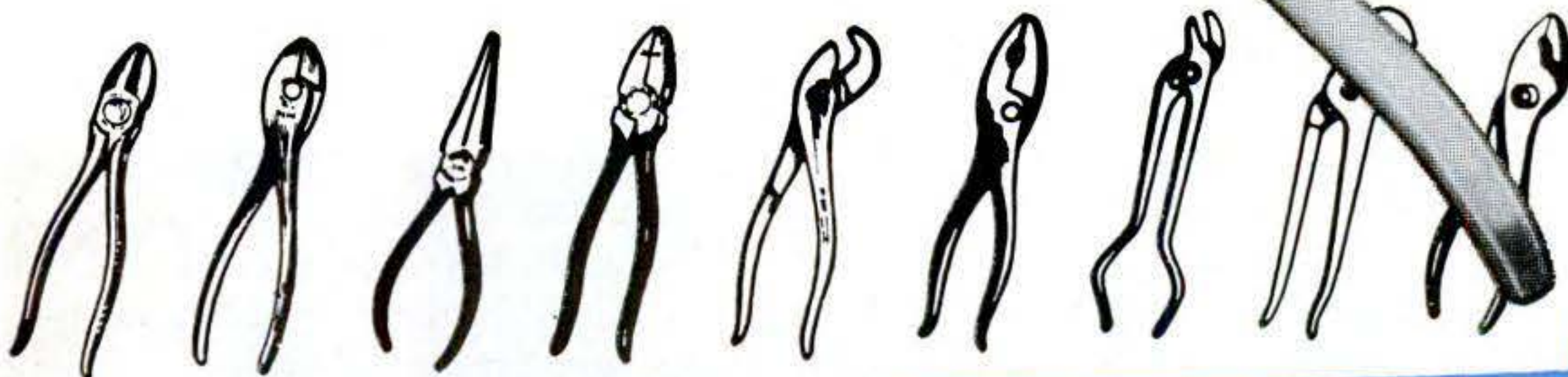
# CHANNELLOCK Pliers

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462 Stanley St., Roxton Pond, Quebec)

Send me.....copies of Stanley Tool Guide. I enclose.....

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## Gus Warms Up a Road Racer

(Continued from page 222)

perature. But when it warms up a little, the metal expands more, and that opening is enlarged. The gasket fails to function, and you have an air leak."

"My word!" was all Pinkerton said.

### Englishman Beats the Deadline

Back at the Model Garage, Gus filed the intake facing smooth, and they drove like a four-wheel stampede to Wicker Creek Road, reaching the races just in time to run a qualifying lap. Then Gus settled back and watched Pinkerton roll onto the starting grid.

There was a short, electric silence . . . then the sharp crack of the starting gun. A thundering roar of unmuffled engines rose to the treetops, and the race was on. The cars howled to the first turn with tire-screaming acceleration and vanished from sight.

Gus listened to the whine of high r.p.m. as the cars hit the far side of the course. He crossed his fingers.

The cars rounded the hairpin at the beginning of the main straightaway and left rubber on the road as they went through the gears. The bigger roadsters shot by, an Allard, two Jaguars, and an Italian Ferrari fighting their separate battle. The road was clear for a few seconds . . . and then a red MG came out of the corner in a four-wheel slide! It was Pinkerton, leading his class. The next MG followed 20 seconds behind.

### Gus Gets the Jitters

Lap after lap, Pinkerton held the lead, and Gus began to worry. It was stiff punishment for both car and driver. And there was that oil filter—only 30 pounds' pressure for a thirsty, straining engine.

The air began to vibrate with excitement, something was going on, but his vision was blocked by a sudden shift in the straining crowd. Before he could squeeze to the ropes, the race was over.

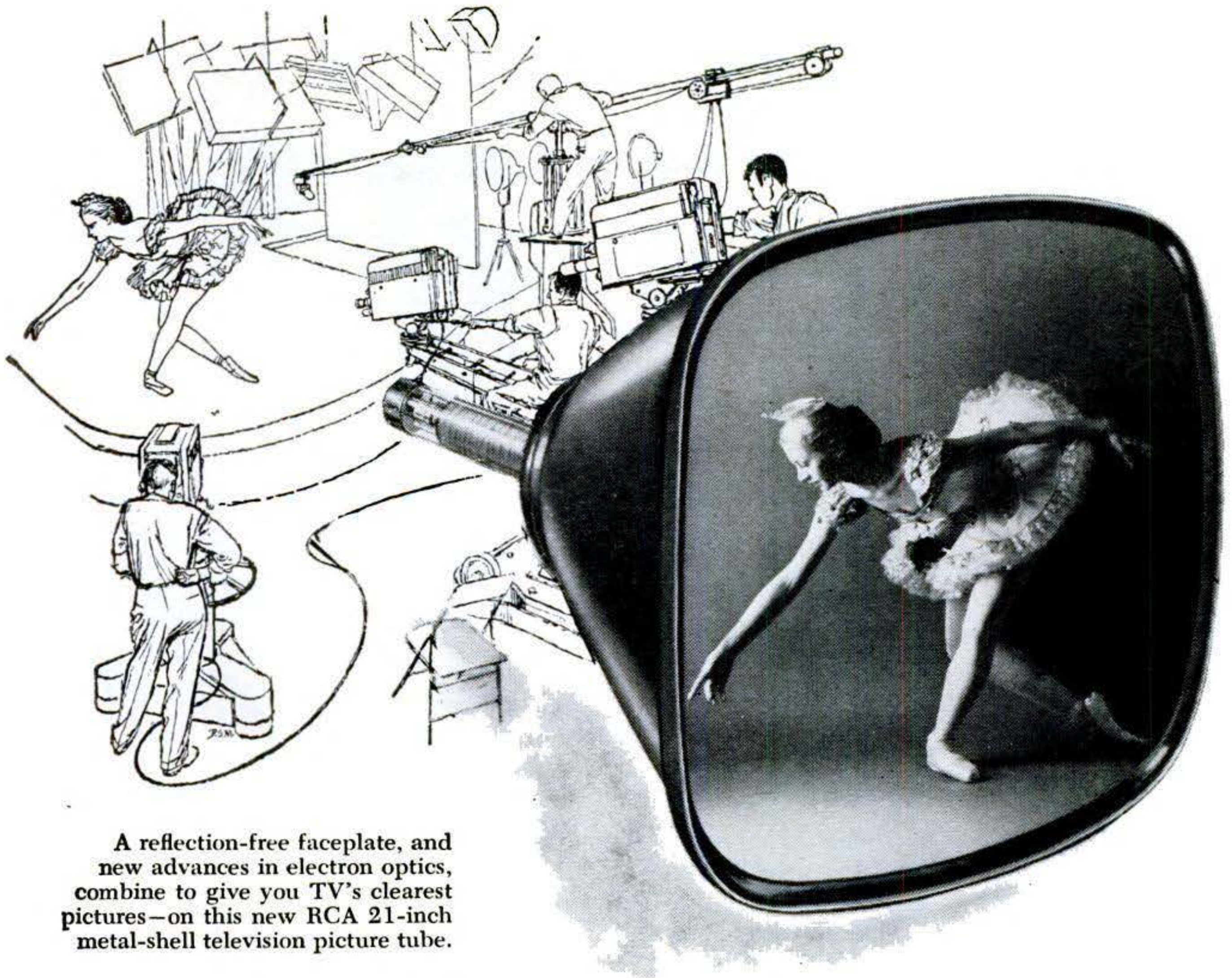
After a few minutes, he found Pinkerton in his pit, calmly downing a bottle of pop.

"Oh, there you are, Mr. Wilson. How'd you like the race?"

"Fine. But that oil filter—how did it—"

"It held up. Now what are you so jittery about, old chap? The Allard and I shared the laurels! Thanks to you, I won!" **END**

*Next Month: Gus goes fishing and gets hooked.*



A reflection-free faceplate, and new advances in electron optics, combine to give you TV's clearest pictures—on this new RCA 21-inch metal-shell television picture tube.

## New, metal-shell television tube makes pictures more realistic!

Benefits for the TV audience were immediate when RCA, in 1949, introduced its first metal-shell picture tube. Engineered for mass production, this new tube made larger television pictures available to more people. Subsequent RCA developments have resulted in progressively better home receivers.

Now RCA scientists and engineers—working on principles pioneered at the David Sarnoff Research Center of RCA—have gone further. Improved methods of focusing, based on the science of *electron optics*, assure more realistic images on your television picture tube.

In addition, the improved Filterglass faceplate is used as the “screen” in the new picture tube. Optically superior, this faceplate diffuses room reflections, transmits a uniformly bright image to the entire screen, and permits wider-angle viewing.

Enthusiastic reception by the industry has resulted in the use of this new tube by leading manufacturers. Be sure, when selecting a television set, to see those with the RCA metal-shell picture tube.

\* \* \*

See the latest in radio, television, electronics at RCA Exhibition Hall, 36 West 49th Street, N. Y. Admission is free. Radio Corporation of America, RCA Building, Radio City, New York 20, N. Y.



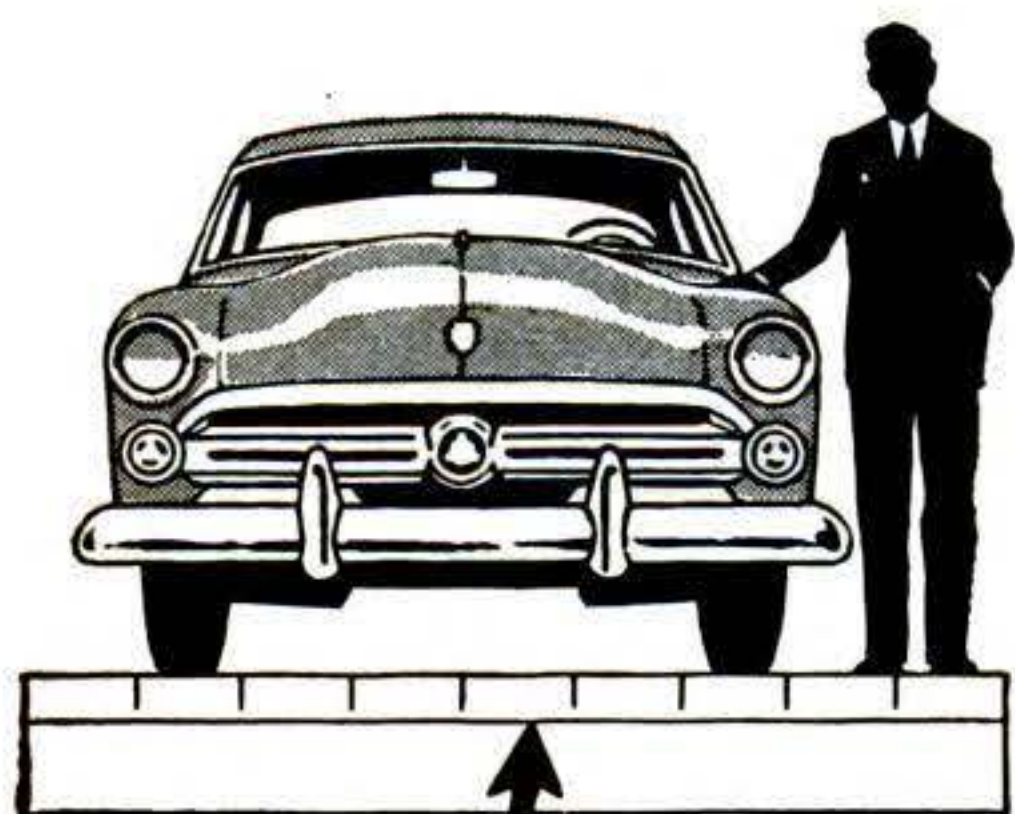
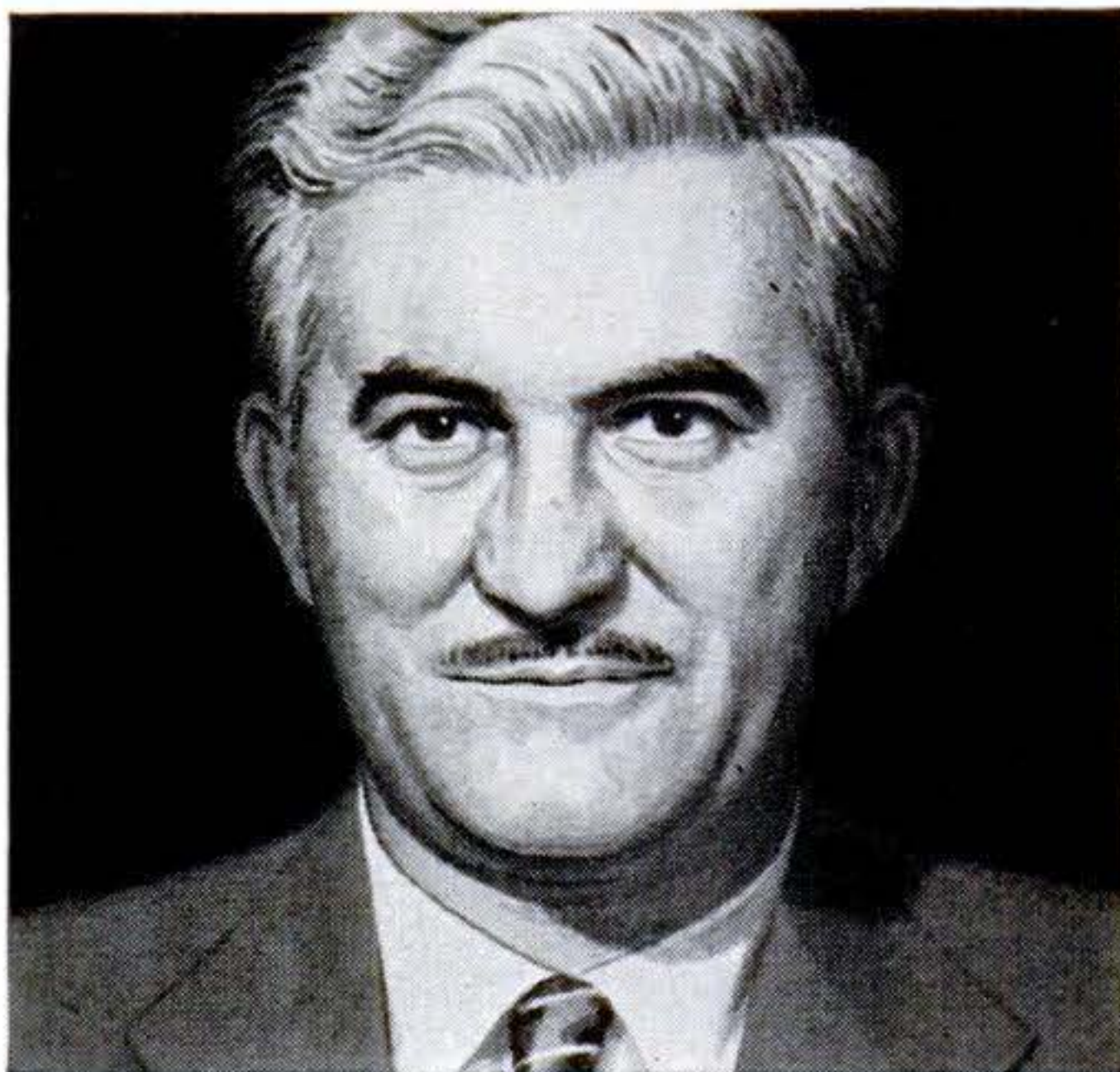
**RADIO CORPORATION OF AMERICA**

*World Leader in Radio—First in Television*

# Here's how Ford controls

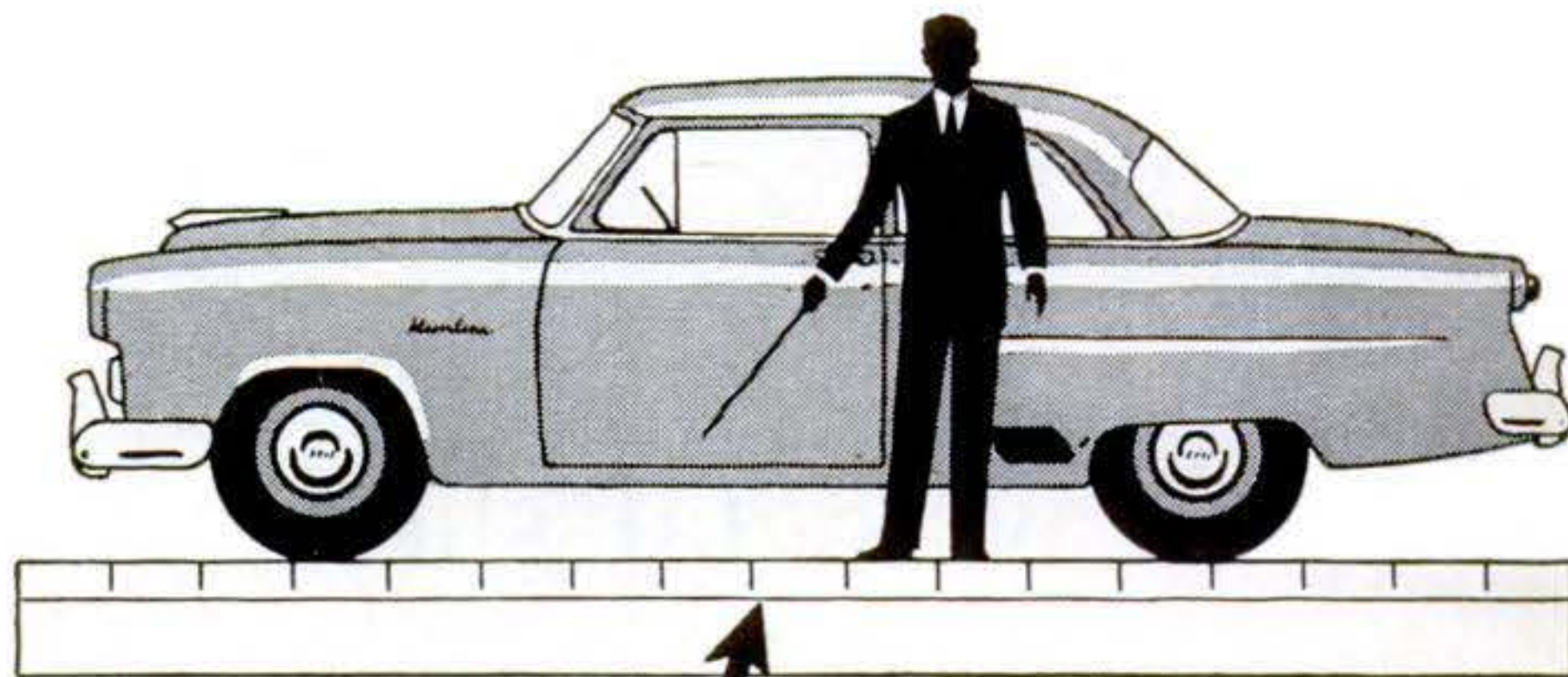
## A picture story by Dr. Roy K. Marshall

Dr. Marshall is a former consultant to the Atomic Energy Commission and a well-known lecturer. He is nationally famous for his simplified explanations of complicated things.



### 1 New wider front tread.

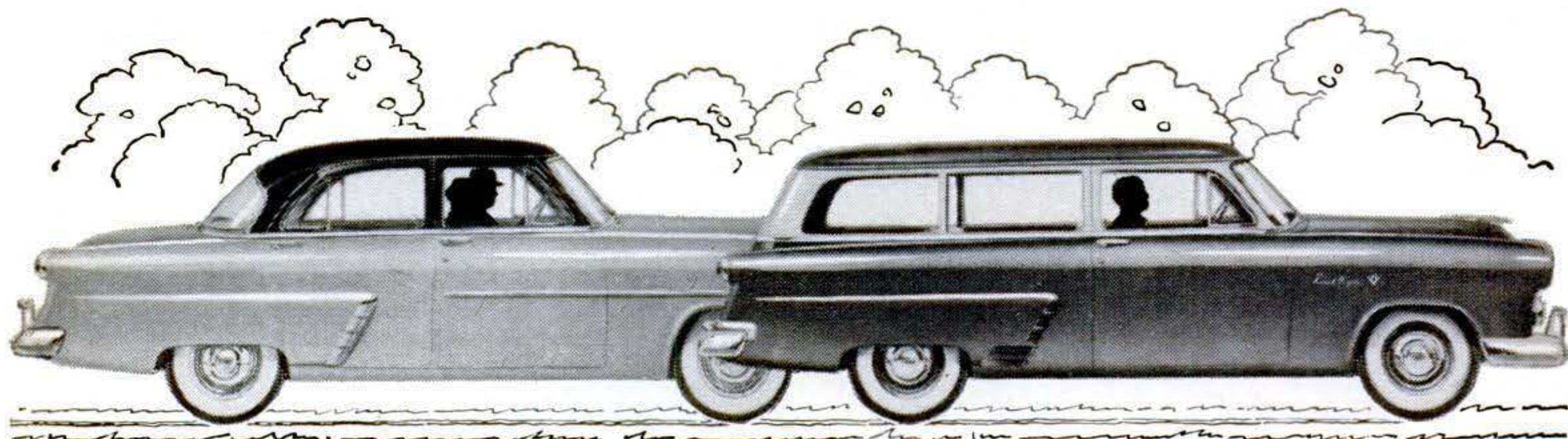
"Ford's wider front tread plus a longer, heavier anti-sway stabilizer bar combat the normal tendency of a car to lean over on curves."



### 2 New longer wheelbase.

"Ford's longer wheelbase plus lower center of gravity help give you a road-hugging ride with practically no road vibration . . . even in rough going."

*You can pay more but you*

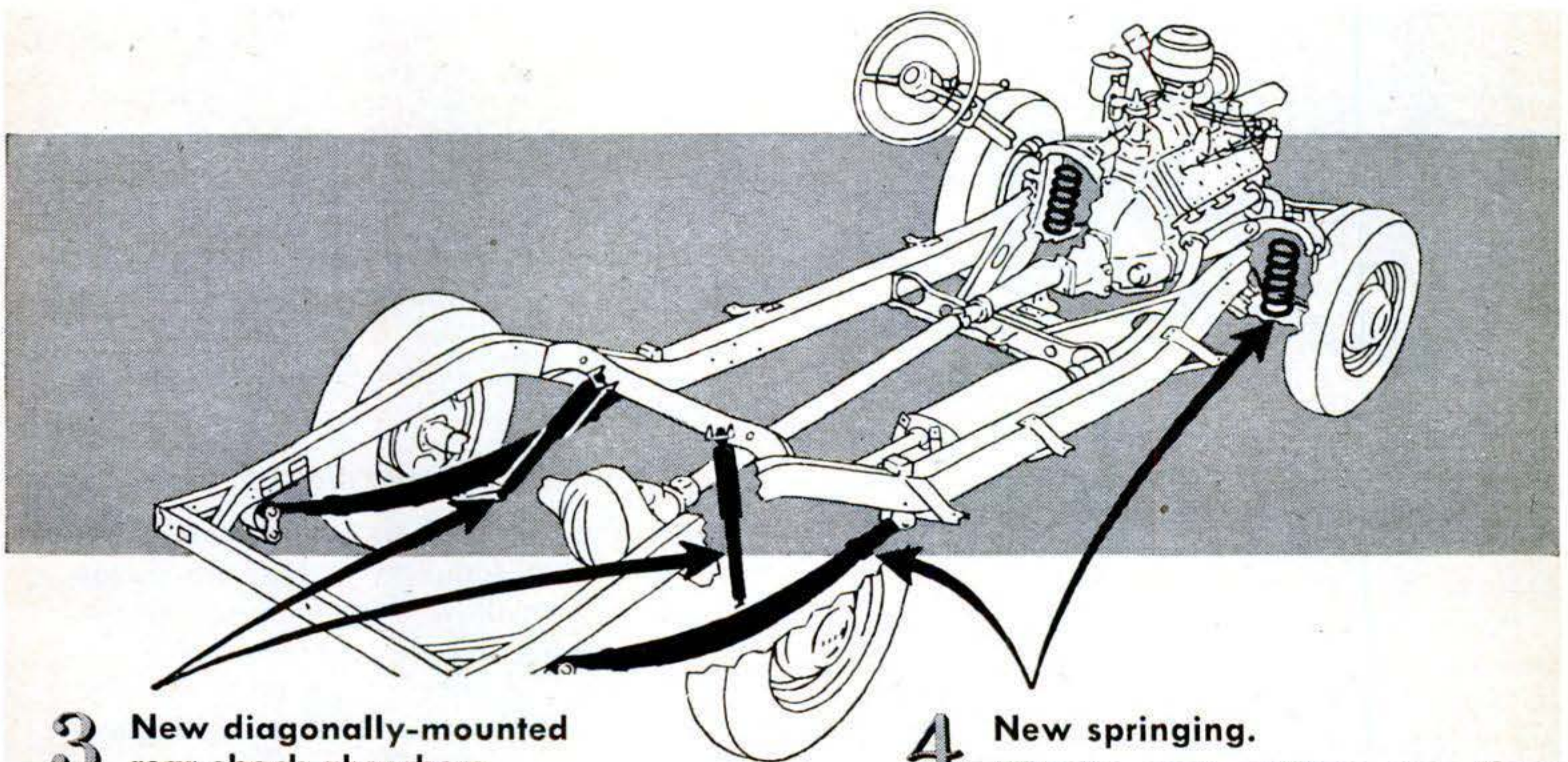


# your ride automatically

**"Ford's New Automatic Ride Control effectively eliminates objectionable sidesway and absorbs bumps."**

"Folks who have driven the 1952 Ford ask me to explain what's behind its obviously smoother ride, behind the way it seems to level out the curves. The answer is many things . . . and they all add up to Ford's

Automatic Ride Control, a unique system of balance and suspension. Below, I explain the major elements of this system which automatically adjusts the car's ride to meet every change in the road."



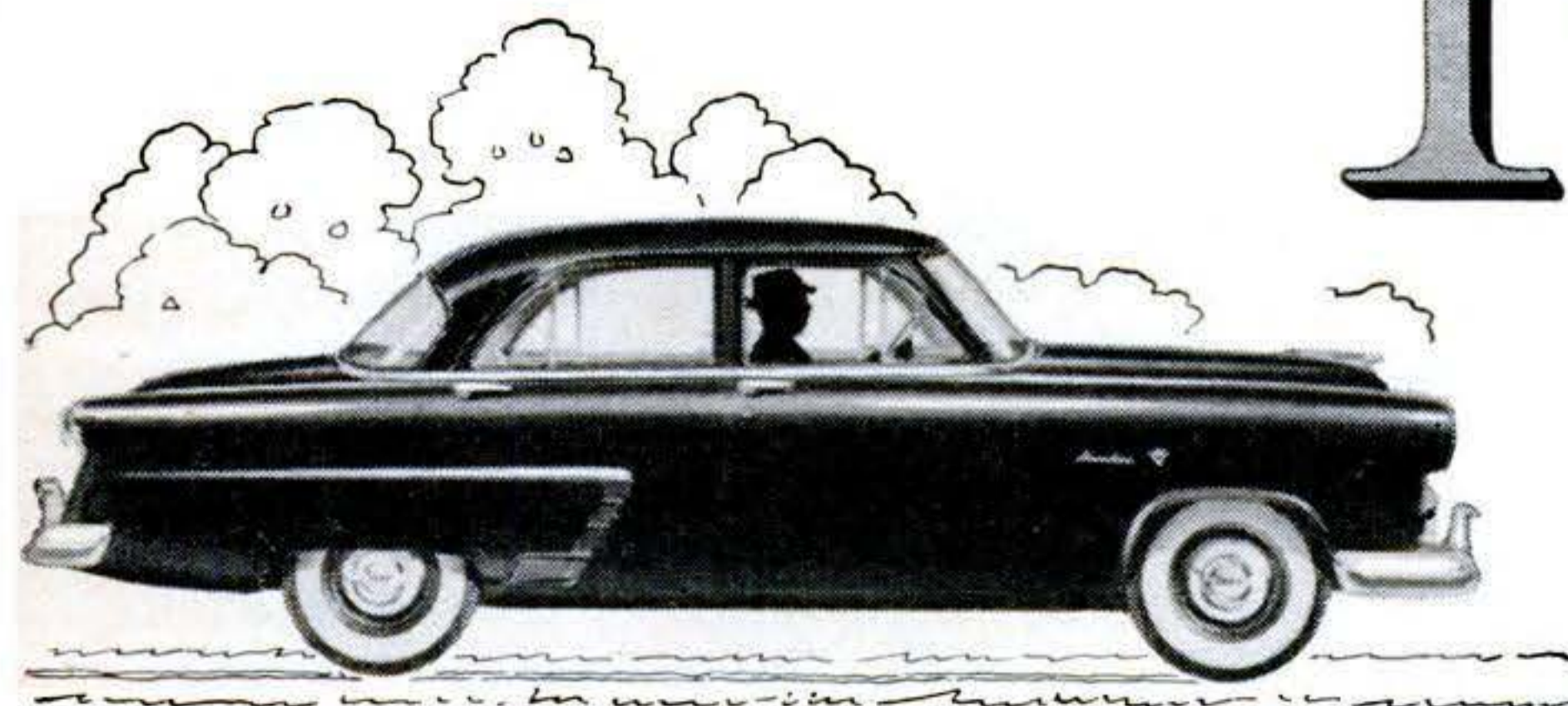
**3 New diagonally-mounted rear shock absorbers.**

"They 'lean in' to help hold the car level on curves, adjust their 'give' as road conditions change."

**4 New springing.**

"Ford's rear springs are three inches longer for easier action. Front springs are tailored to each model's weight for more precise ride control."

*can't buy better!*



# Ford

White sidewall tires and two-tone combinations illustrated, optional at extra cost. Equipment, accessories and trim subject to change without notice.

IT TAKES **2** HOLES  
TO MAKE A PUNCTURE



● Anything that punctures your tube must go *through* your casing. You have the tube repaired, but what do you do about the **FIRST** hole . . . the one in the casing? Never neglect it!

Punctures in casings—even small ones—suck up dirt and moisture, cause rot, result in blowouts, waste thousands of tire miles. To make tire mileage stretch, it's important to get all the tire service you can. It takes **TWO** holes to make a puncture . . . always have **BOTH** repaired.



Your Bowes "Seal Fast" dealer has the finest tire repair materials . . . equipment . . . and "know how." Take your tire troubles to him. He will inspect your tires thoroughly *inside and out*. When he finds trouble he will fix it and give you many added tire miles . . . and **SAFETY**. For *safe* tire service, look for the Bowes Emblem.

**BOWES "SEAL FAST" CORP. • INDIANAPOLIS 7, IND.**

## Biggest Job Since the Panama Canal

[Continued from page 109]

poem by Mrs. Charlotte Rivers in the Allendale, S. C., *County Citizen* recently had this to say:

*In fields where bloomed the cloudy banks  
Of wild plum spreading low  
Against the furrow's curving cheek—  
The little houses grow.*

*And some are pink and some are blue  
And all of them complete  
With picture windows gaping  
At the ones across the street . . .*

*So weep not for the timid dove  
Evicted from her nest  
Nor fallen pine which housed the squirrel.  
A fool knows it is best*

*For nails to flash and hammers fly  
On "prefabs" where must dwell  
The men who toil to make a bomb  
To blow it all—Ah, well!*

As a matter of fact, the prefabs are substantial, attractive houses that come in a variety of finishes and are being put up in half a dozen areas. They are made by the Knox Brothers at Thomson, Ga., 50 miles away, and every week 20 or 25 of them—half the plant's output—roll into the Aiken-Augusta region.

### Ex-GIs Get a Pretty Good Deal

Another 20 or 25 houses—conventionally built and very handsome, too—are being finished each week by the old firm of Gross-Morton, which came down from New York to develop a big, rolling area off U.S. 1 on the north edge of Aiken. The Knox Brothers use an assembly-line technique at the plant; Gross-Morton uses it at the site.

A number of other developers are busy, so that by the end of the summer there may be several thousand new houses clustering around the perimeter of the H-bomb reservation. By present-day standards, prices are low—not more than \$10,000 for a three-bedroom house on a good-sized lot. Since this is a defense area, a veteran, like young Mr. Biddison, can buy a house with no down payment except closing costs. Permanent AEC or du Pont employees—relatively few—can rent houses at \$60 to \$80 a month.

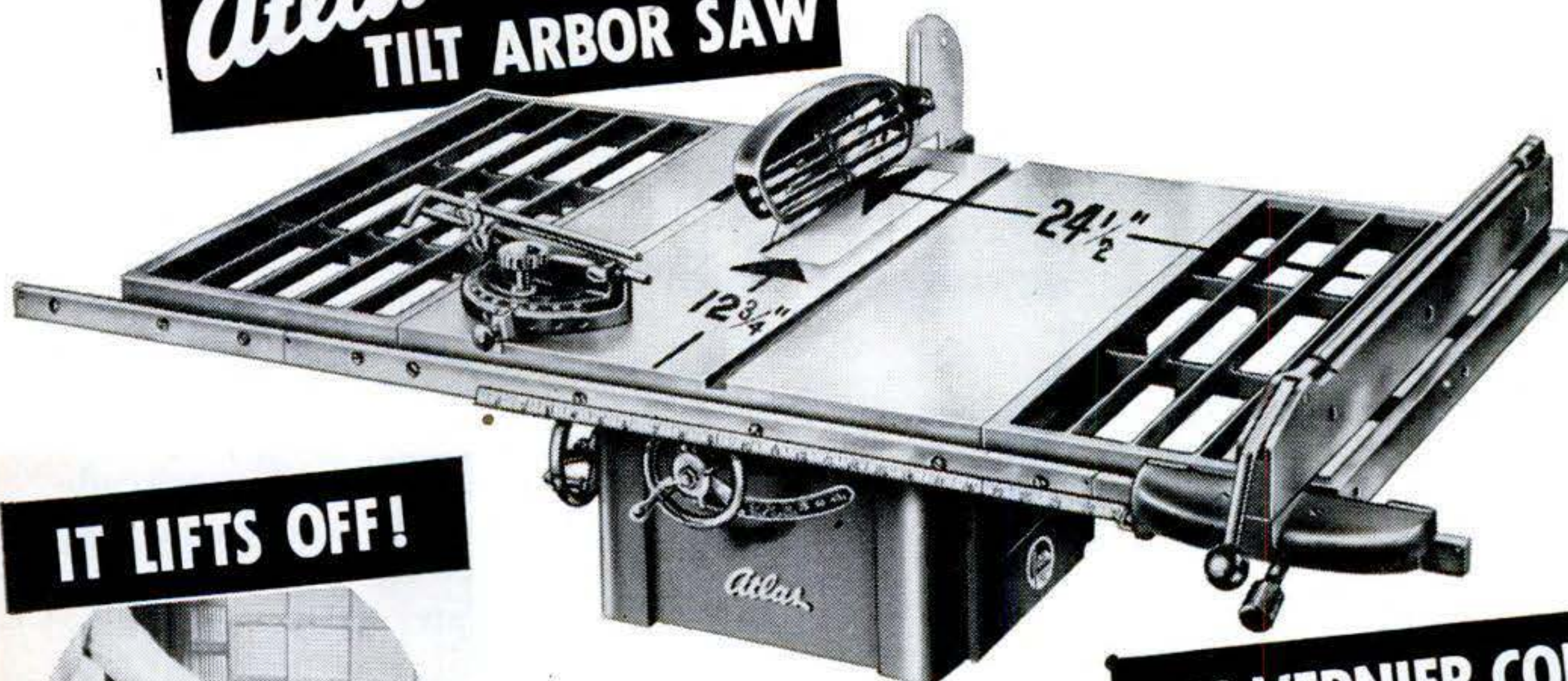
To house workers without families, another contractor is building and operating dormitories for 7,500 single men, who will pay \$8.25 for a barracks room limited to

[Continued on page 230]

# LOOK at the *Atlas* FENCE—TRY IT

It's the Easiest to Use, Most Accurate Fence Ever Developed

**Atlas 10" TILT ARBOR SAW**

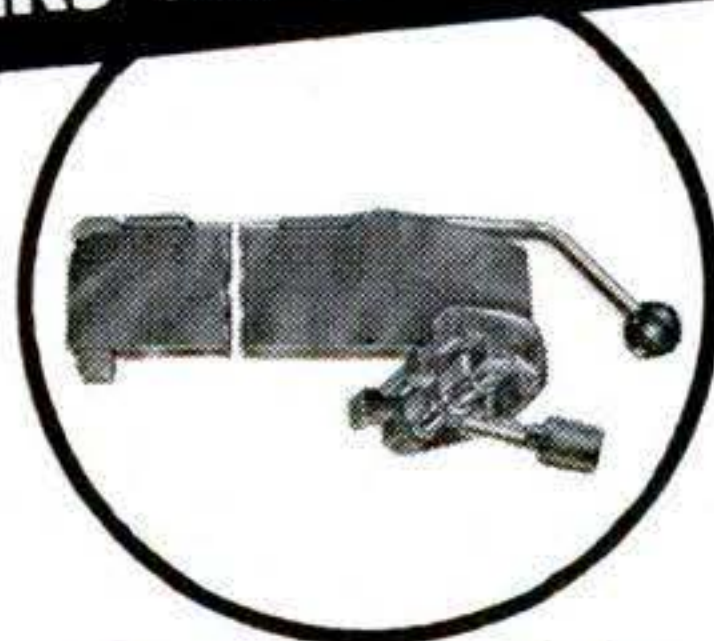


**IT LIFTS OFF!**



Releases instantly for lifting off or positioning either side of blade. A great time saver.

**LOCKS AT BOTH ENDS!**



One movement of the lever locks both ends of fence to table. It's anchored in place — can't move to spoil your work.

**HAS VERNIER CONTROL!**



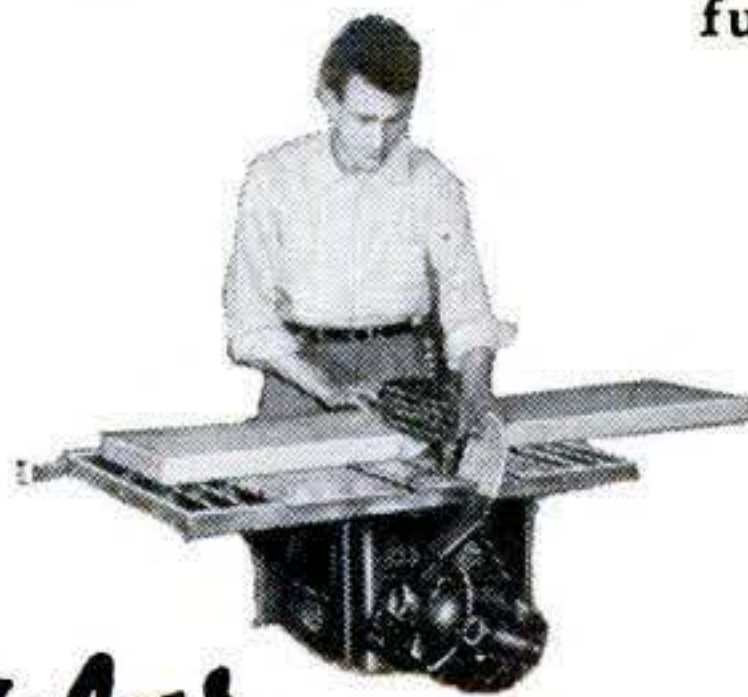
Fence slides smoothly to position you want — has Vernier control for exact setting.

**T**HE FENCE alone makes Atlas the saw to see before you buy, and in an Atlas you'll find a host of other advanced features that will be of great importance to you in your work. It has the capacity to build a garage, a house, or remodel a room — the accuracy for "factory-quality" work on fine cabinets and furniture, cupboards.

You'll like the big precision-ground grey-iron table; the smoothness and long-service of its large sealed-for-life ball bearings; the easy operating blade-height and angle controls. Blade cuts 3 1/4" deep — tilts to 45° — work is always flat. It's a big, rugged, fast, efficient saw — sure to make your shop and your work outstanding in the neighborhood.

SEE *Atlas* 8" SAWS, TOO!

Built with the same precision construction features — has the same exclusive Atlas fence — as the 10" saws.



**Atlas**

DEPENDABLE QUALITY TOOLS SINCE 1911

**FREE — Woodworking Tool Catalog**

ATLAS PRESS CO., 655 N. Pitcher St., Kalamazoo, Mich.

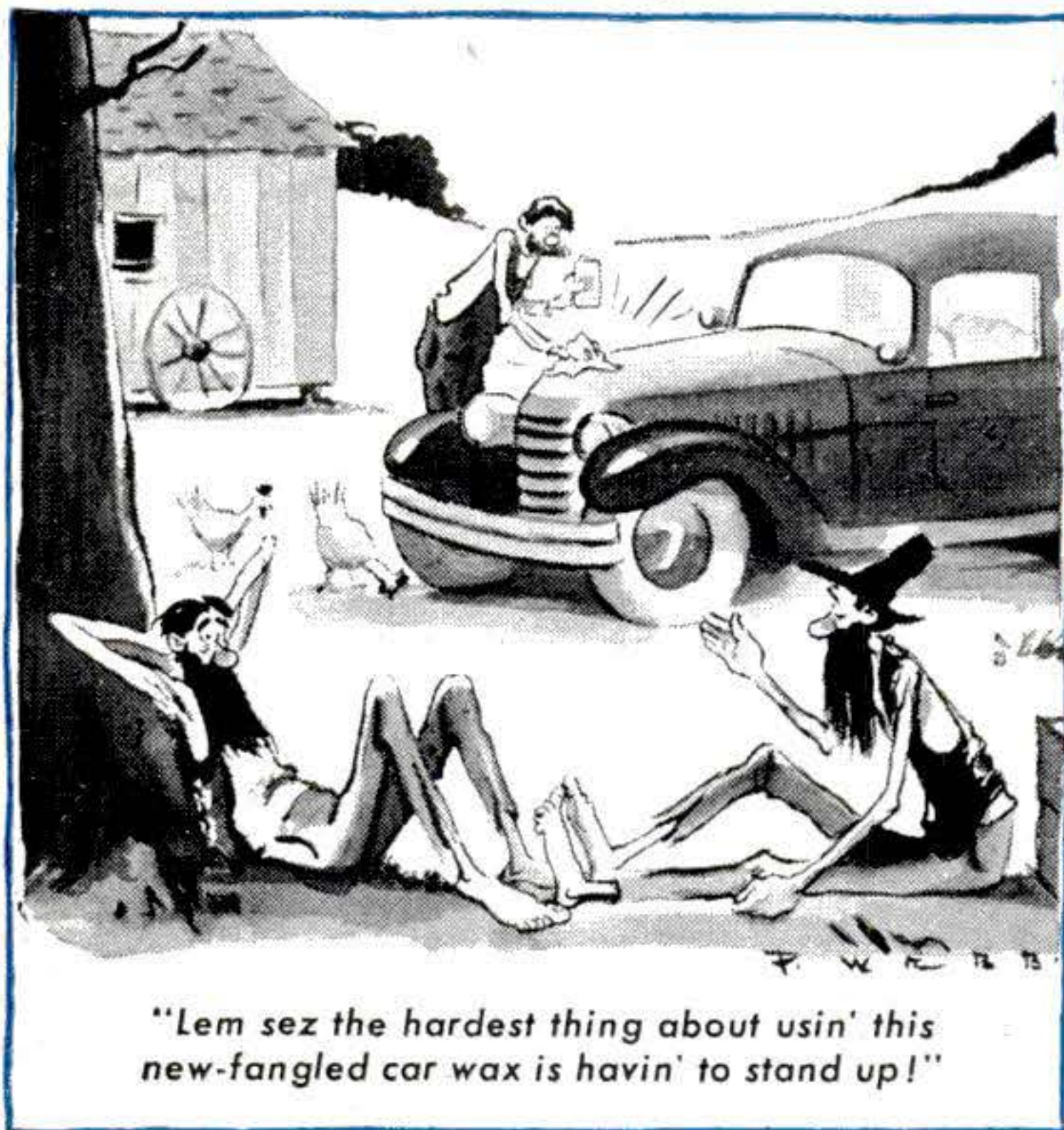
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# 'Taint no trouble to give your car long-lasting wax protection!



"Lem sez the hardest thing about usin' this new-fangled car wax is havin' to stand up!"

## Johnson's Car-Plate Waxes any car in 20 minutes!



**Spread it on—no rubbing—let it dry!**  
**Wipe it off—no rubbing—that's all!**

Johnson's Car-Plate is the no-rubbing auto wax described in Reader's Digest. Its shine is as bright and long-lasting as a hard-rub professional wax job costing \$15 or more! Don't delay. Wax your car the easy way. Pick up a can of Johnson's Car-Plate today.



**Car-Plate CLEANER...**  
**New, better, faster!**



Developed especially to clean and condition the finish of your car for a perfect Car-Plate wax job. New Car-Plate Cleaner safely removes all greasy road grime—goes on and off with minimum of effort!

Protect your car's chrome trim. Clean with Johnson's Chrome Cleaner—protect with Johnson's Car-Plate.

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## Biggest Job Since the Panama Canal

[Continued from page 228]

two. But the new accommodations total less than 12,000 units, while the new jobs scheduled to open up before September total 17,000.

### The Old Order Changeth

Project officials like the emphasis on wheeled housing because it means, they say, that there'll be no shantytowns to clean out. House builders are less happy. They argue that the area's permanent expansion will not be limited to the 7,500 operating employees of the H-bomb plant—that some of the other 45,000 workers, and the tradesmen, craftsmen, salesmen and other people coming in to serve them, will remain.

The H-boom is just moving into full speed, but the old order has already changed. Take Aiken. It used to be that along in spring, with the camellias done blooming and the winter visitors gone elsewhere in pursuit of horses, hounds and golf, the place would ease into a long siesta. Now hotels ask that reservations be made 10 days in advance. Motor courts are filled by late afternoon. Retail business has shot up more than 25 percent, and people stand in line for the movies.

### Even the Fish Are Protected

The man I feel sorry for, though, is the foreman who discovered that Three Run Creek, running through the Project, was a fine bass stream. One recent Saturday he went home with a four-and-a-half-pounder. It turned out to be his first and last catch, for Three Run now flows behind barbed wire, its fish protected—in the interest of national security—even from guys with badges and high clearances.

The Savannah River Project, incidentally, seems to have done a good job of making its army of workers security-conscious. Driving north one Friday evening, I stopped at a gas station 50 miles out of Aiken to get a flat fixed. As I waited, three men from the neighborhood came in, cashed a check, and bought a few cans of beer. Their aluminum helmets stamped them as SRP construction workers, so I asked one of them how long it took to commute. First he looked at my head, which did not display an SRP helmet, then he looked at my left lapel, which did not carry an SRP badge.

"Depends on the traffic," he said curtly, and walked away.

END



don't paint it...



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Sprays: paint  
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**PAINTS**  
furniture, doors, toys, etc.

**AT LAST - A HIGHLY EFFICIENT, PROFESSIONAL TYPE LIGHT WEIGHT ELECTRIC SPRAYER!** For only \$7.95, less than the cost of a good brush, you can save time, work and money. This brand new, recently developed electric sprayer weighs only 1½ pounds, yet is more efficient in handling oil or water based paints, varnish, enamel, shellac, lacquer, oils, disinfectants, insecticides, garden sprays, or most all types of liquids which can be sprayed.

**TRY IT  
FREE  
FOR 10 DAYS  
AT OUR  
RISK!**

**COMPLETE - READY TO USE!** There are no extras to buy in the "B.V.I." sprayer as it uses an 8-ounce mason jar which can be replaced instantly. Handy fingertip switch and 8-foot insulated cord permit easy handling and reaches into hard-to-get-at corners, ceilings, rough concrete, wood, screens, etc. The "B.V.I." requires no extra hose, compressors or tanks. Merely plug in, press the switch, and spray easily, effortlessly, and conveniently.

**RENOVATES**  
scratches on cars, furniture, etc.

**PAYS FOR ITSELF MANY TIMES OVER!**  
When spraying or painting, you get a more uniform, professional appearing job that saves you time, effort and money. There are no brush marks to show, no drippings or paint splashes. All in all, you get a cleaner, more efficient job that you will be proud of.

**FACTORY GUARANTEED!**  
You get a double guarantee both by the manufacturer, the Burgess Vibrationcrafters Inc., and Imperial Sales Co. If you find that you cannot get an efficient, professional type application, then return the "B.V.I." Sprayer within 10 days for complete purchase price refund.

**EASY ADJUSTMENT!** The "B.V.I." Sprayer applies paint smoother and faster than any brush, and with a convenient adjustable spray control. You can utilize a fine or heavy, thick or thin spray, whatever your needs may be for the job you are doing.

**DISINFECTS**  
closets, rooms, receptacles, etc.

**LUBRICATES**  
cars, bicycles, machinery, etc.

**HUNDREDS OF USES!**  
You can use the handy "B.V.I." in and around the home for moth proofing closets, painting kitchen cabinets, spraying furniture, for insect control or any household item. You can use the sprayer outdoors for building surfaces, automobiles, toys and bicycles; in the garden for pest control; on your walks and patios. The "B.V.I." can be used on the farm and in the barn for livestock and equipment.

**REACHES, SPRAYS**  
ceilings, all hard-to-get-at places

**KILLS INSECTS**  
on flowers, plants, shrubs, etc.

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## HI-POWER COMPLETE ALL-PURPOSE POWER TOOL KIT

Features Hi-Power  $\frac{1}{4}$ " Electric Drill for use as a portable tool, and the easy handling PET Drill-Saw with 4" blade that takes the work out of cross-cutting and ripping boards up to 1". Also includes Horizontal Stand and bits, plus accessories for sanding, polishing, and mixing. This 22-piece Hi-Power Kit, Model 77-16, is a real thrill for anyone who likes to build or repair things around home, farm, shop. Complete with sturdy metal carrying case—only **\$26.60**



**Model 510**  
 $\frac{1}{2}$ " drill—  
**\$38.75**

**ZEPHYR** ELECTRIC DRILLS—lightweight, modern streamline designs. Precision dynamically balanced, smooth running, AC-DC motors.

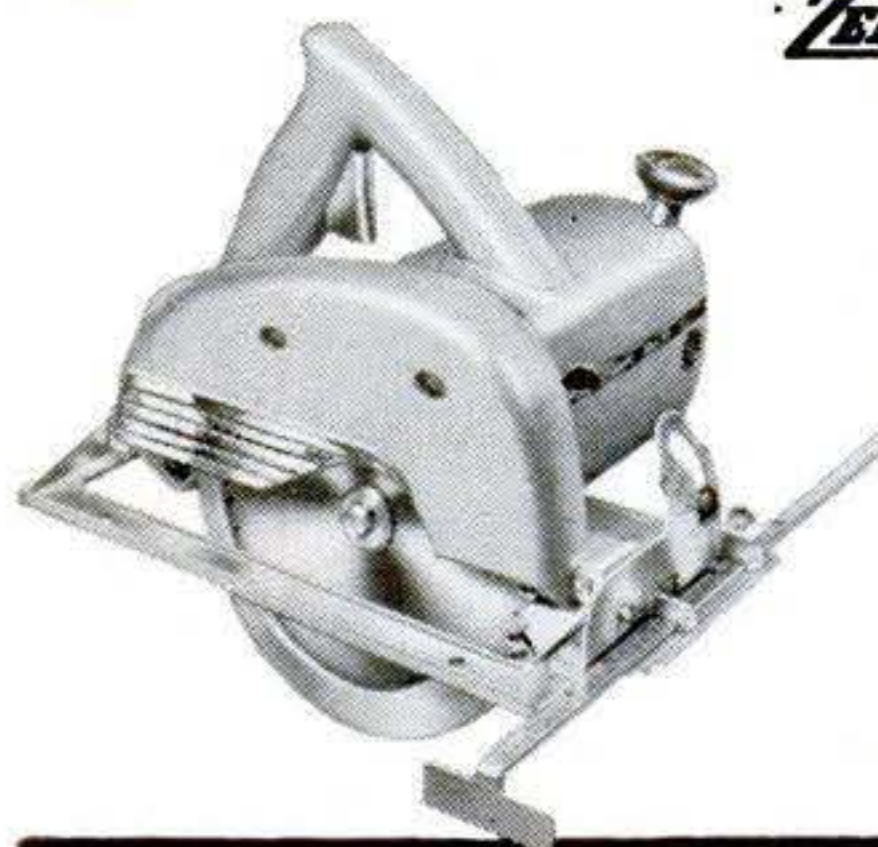


**Model 1950-H**  
 $\frac{1}{4}$ " drill—**\$18.95**

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**HAND SAW**—Balanced, lightweight design for easy handling in any position.  $6\frac{1}{4}$ " blade. Depth of cut  $2\frac{1}{8}$ ". Adjustable for depth and angle. Includes graduated ripping guide. AC-DC motor. Price **\$47.50**

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326 West 83rd Street, Chicago 20, Illinois

In Canada: Portable Electric Tools, Ltd.

369 Danforth Rd., Toronto 13, Ontario

## Has the Fly Got Us Licked?

[Continued from page 116]

To get a good residual, scientists can try to develop either a better synergist than DMC or a poison completely different from those now used. They are pushing hard towards both goals.

Two new poisons offer some hope. One is an agricultural insecticide called Dilan. In tests it has done a good job against house-flies, though not as good as DDT did in its prime. But the tests have also shown that flies can develop resistance to Dilan even though this compound is completely different from DDT. Presumably, Dilan—against flies—is merely a stopgap.

### War Poison Tried

The other new poison is parathion, an organic phosphorus compound. The Germans developed it as a chemical-warfare weapon against humans, and the trouble with it is that it still works that way. One of parathion's relatives, however, may be able to kill flies without poisoning people, and scientists now are following that lead.

The synergists provide the most promise. In laboratory tests, one of these—chlorinated chalcone—has put the old-time potency back in DDT even in a residual application.

But the question remains: What will this summer's field tests show?

### Flies Don't Travel for Fun

The 1951 work—conducted in Phoenix, Ariz., and in several Georgia areas by Communicable Disease Center men—underlined two vital facts:

First, no section of a community is safe from flies if another section harbors them. In the Phoenix tests, for example, some of the flies caught and released in an area rich in privies, pigpens and uncollected garbage were later picked up in the business and residential sections.

Second, flies don't travel for the fun of it; they move toward feeding places like hogs crowding around a trough. If you have a lot of flies you can be certain there's something around your place that will attract a lot more of them.

Not satisfied with what they learned last season, the investigators now plan to release flies simultaneously at a number of spots in and around Phoenix and study the effects of weather and temperature on their meanderings. The use of dyes and radioisotopes will simplify the work.

END

*yes, I'm an engineer... but*

# how can I become an AIRCRAFT engineer?



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The step up to Aircraft Engineering isn't as steep as you might expect.

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## Gas Savers Boost Mileage 50 %

[Continued from page 151]

as possible and still beat the clock. Every extra mile-per-hour cost gas. They gauged speed to hit traffic signals green.

Long before daybreak the next morning the caravan was lined up on a slight downgrade in front of Bright Angel Lodge. Already the shakedown had begun to take its toll. One car wouldn't release from high gear. It took off anyway, the driver racing his engine and slipping his clutch. That cost gas. Another car reported carburetor trouble but kept going.

We rolled around a bend into Marble Canyon. Portable pumps poured out delicately measured quantities of fuel.

### Drivers Battle Wind and Time

Now we climbed. Bob Blee was slipping back into second gear too often. In 40 miles we reached Jacob Lake, 4,400 feet above sea level. Some of the contesting cars got caught behind trucks on upgrades and had to drop into a lower gear. That cost gas.

So did wind. From Anderson Junction to Provo the cars battled a brisk headwind. What was it costing—two miles to every gal-

lon? What should you do—slow your speed to save gas and wait for a long downgrade, or hit the throttle to beat the clock? Load up with a little extra at a refueling stop for safety, or take on what you think is just enough and chance a dry tank?

The wind caught one car on this stretch. It was disqualified when it had to refuel at an unauthorized station.

Another car passed a truck on a grade despite a double line which forbade passing. The driver would be reported.

Westward and northward we sped across Utah, then up toward Twin Falls. We made time in the open country. Bob Blee was anxious to get to the finish line. How much gas was our speed costing us?

At Sun Valley we rolled on to the rodeo grounds. Blee cut his ignition. He topped off his tank and did some arithmetic. I watched him make a wry face.

The contest cars had averaged 22 miles to the gallon. A car identical with ours had averaged 23 miles to the gallon. And we—well, after all, we hadn't been trying to save gas. Our average was 15.75. END

## Only **TAC** has perfected the open-end ratchet wrench...

This TAC Open End Ratchet Wrench is doing spectacular jobs in the Armed Forces and Defense Industries. Made in Socket Type and Crowfoot type.

Sizes  $\frac{3}{8}$ " to 4". Will operate with as little as 7° ratcheting arc on fittings, tubing, pipe, rod, cable, etc. Fully protected by patent

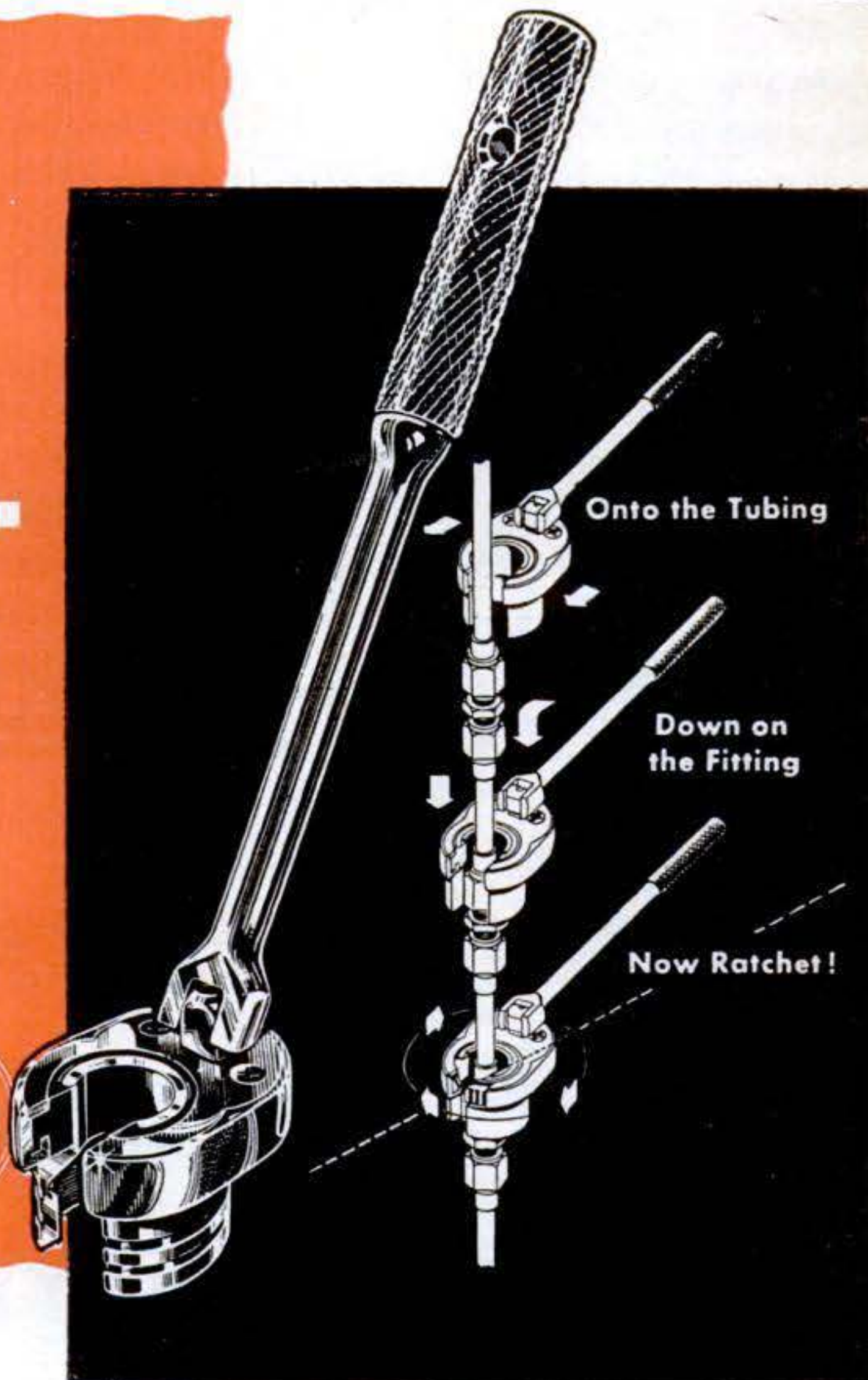
*TAC does what no other tool can do.*



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**TAC**



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## Exclusive GIL-BILT Build-It-Yourself Features

- No machining—build easily with hand tools only
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- Sturdy wood, aluminum and steel construction
- Capacity and performance of commercial saws selling for \$60 and up

**BANDSAW**  
**BELT SANDER**  
**SAVE \$50.**  
**OR MORE**

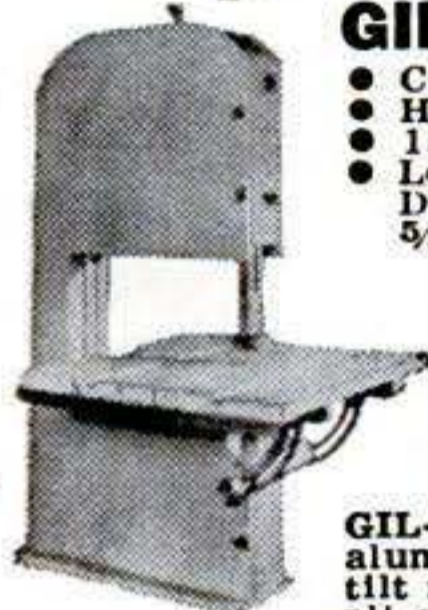
## GIL-BILT 10-INCH TILTING ARBOR SAW



- 27x28 in. table, 13½ in. capacity in front of blade
- 10 in. blade cuts 3¼ in. deep, tilts full 45 degrees
- Floor model 34" high, table always stays level
- New Departure ball bearing arbor, ¾" precision shaft turned down for 5/8" bore blades, alum. housing, shipped ready to run
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GIL-BILT Metal Parts Kit includes Plans, ball bearing arbor, miter gauge and bar, rip fence guide, dado insert, lock knobs, jack screw mechanism and handwheel, and all other metal parts (less blade).....\$20.95  
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## GIL-BILT 12-INCH BAND SAW



- Cuts to center of 24 inch circle
- Handles stock up to 6 inch thick
- 18x18 inch table tilts 45 degrees
- Lower wheel and drive pulley runs on sealed New Departure Ball Bearings; Upper wheel runs on two 5/8" bore Oillite Bronze bearings
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GIL-BILT Metal Parts Kit includes Plans, rubber tires, aluminum wheels, ¼ in. blade, ball bearing spindle, tilt mechanism, blade guides, table tilt segments, and all other metal parts.....\$21.95

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Write for leaflet

## IMPERIAL Roller Cleaner

Wilson-Imperial Co., 121 Chestnut St., Newark 5, N. J.



If you like fine tools



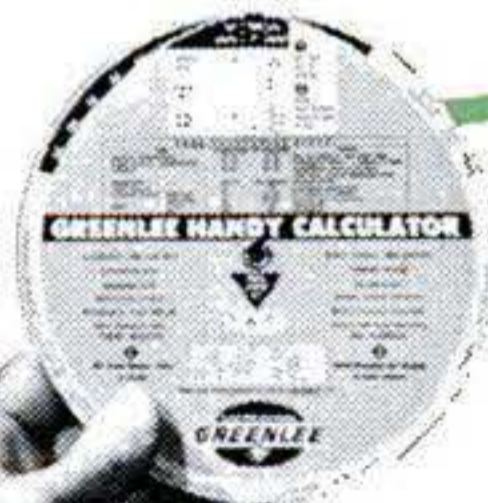
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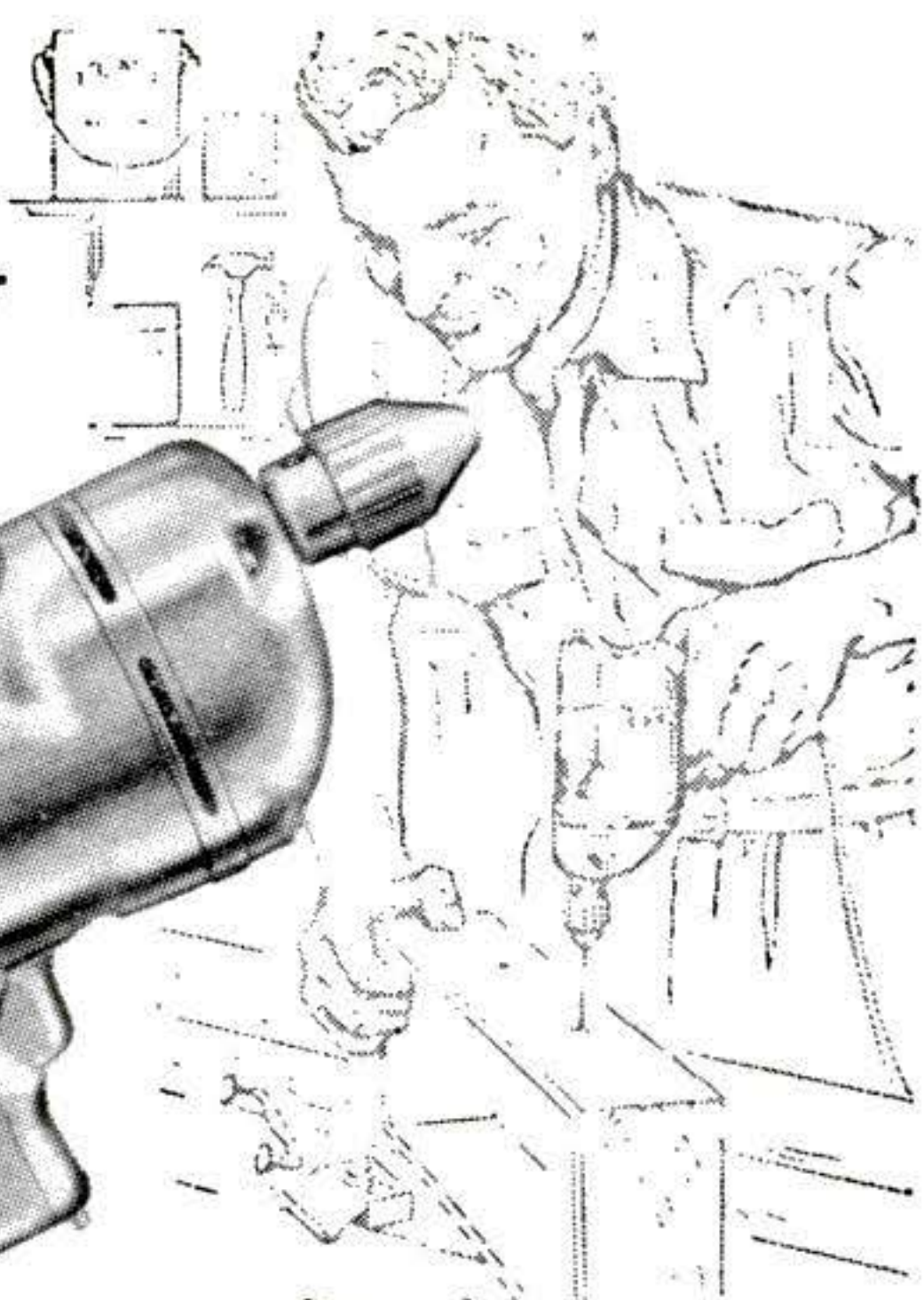
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**1/4" Drill**  
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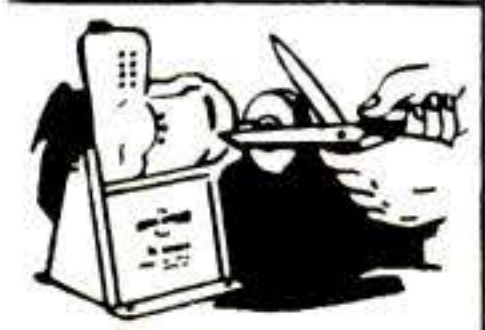
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**PORTABLE  
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**DRILLS • SANDER-POLISHERS • SAWS • KITS**

## Hydro Power Drives Biggest Electric

(Continued from page 147)

and followed the chasm of the Wenatchee River toward the level uplands far below. Stations were coming at us faster now. Agents waved as we thundered past. The field lever was off and the engineer had opened the controller past its 25th notch.

### Where Steam, Diesel and Electric Meet

Later, when the mountain run was at an end, we sat in Joe Gaynor's office in the Wenatchee yards. Three types of locomotives idled on the tracks outside our window, for the trolley wires terminated at this famous apple-packing city on the Columbia River. Eastbound, Diesel and steam were the prevailing types of power on the Great Northern. Occasionally, both breeds assisted on the rugged grades off to the westward when traffic was heavy.

I wanted to know how they compared in performance.

The 53-year-old electrical engineer took a sheaf of papers from his desk. "First off," he began, "count out steam locomotives. In the old days the Great Northern had to use three big oil-burning Mallets to drag 2,500 tons up the Chumstick and Cascade grades for 25 miles in five hours. A pair of our earliest Westinghouse electrics soon were hauling 3,000 tons over the same 25-mile stretch in one hour and 40 minutes. Steam just isn't in the competition."

### Electric Operation Is Cheaper

But Gaynor, white-haired and restless, conceded that the rivalry between Diesel electrics and straight electrics was considerably more complicated.

"Take that locomotive we rode across the divide tonight," he said. "General Electric built it in 1949 just to our specifications. It cost \$500,000—about the same as a four-unit Diesel. That one electric cab will move 2,150 tons up our 2.2-percent Cascade Division grades at a speed of 15.8 miles an hour. A freight Diesel of four units will haul 2,140 tons on the grade at 15 miles an hour—10 tons less and nearly a mile slower."

Turning to other ledgers and records, Gaynor added that operating costs entirely favored the electric. "In 1950," he said, "the Great Northern spent 82.6 cents per locomotive mile for our electrical operation between Skykomish and Wenatchee. Diesel operating costs east of here, by contrast,

[Continued on page 238]

# Genuine Ford brake linings get

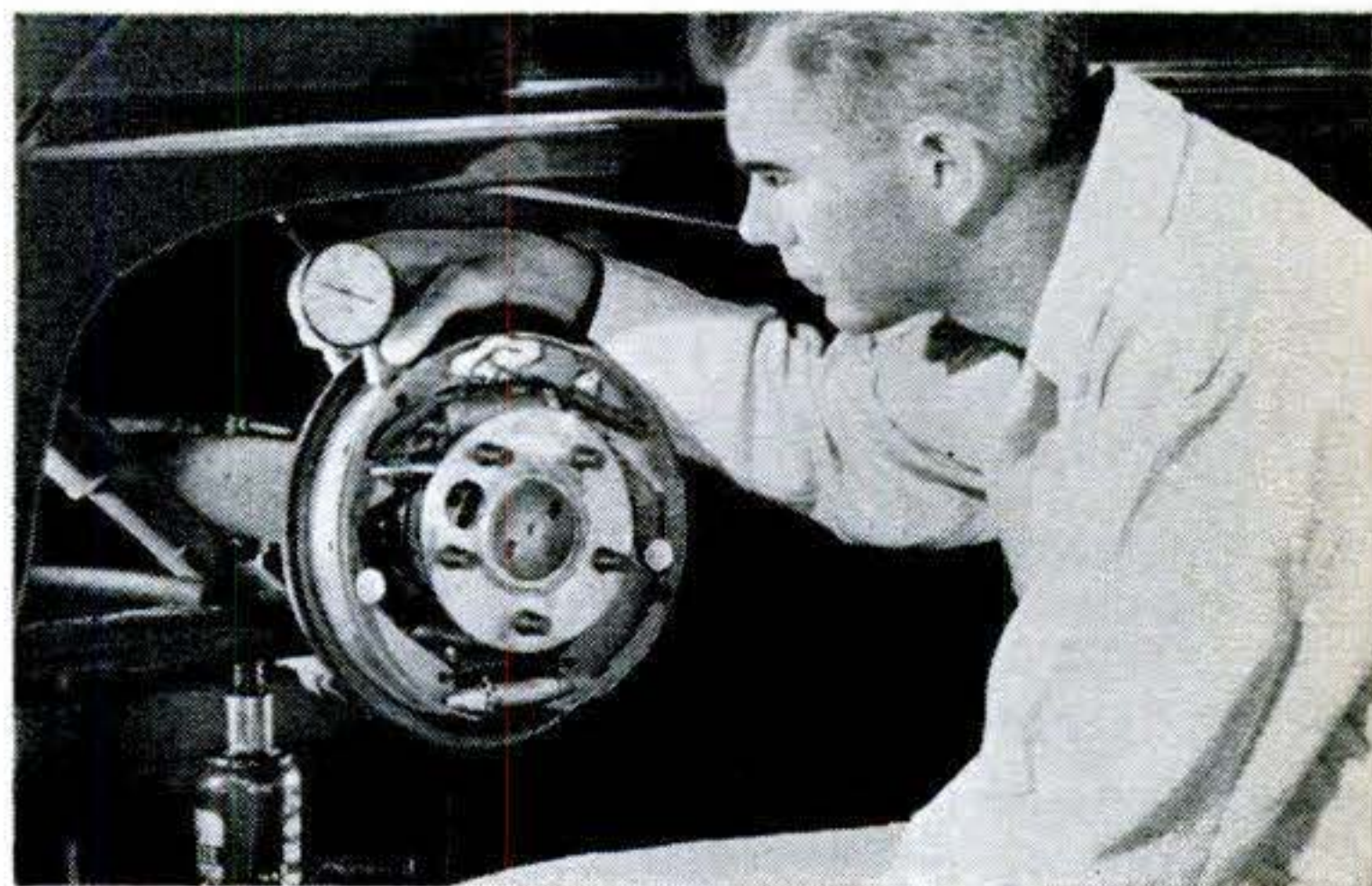
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132-138 Lafayette St., New York City • Barrie, Ont.**

## Hydro Power Drives Biggest Electric (Continued from page 236)

ranged from \$1.30 for each locomotive mile to \$1.45.

"It all adds up," said Gaynor in conclusion, "to whether a railroad wants to risk the huge original cost of installing a trolley system, poles and substations to gain the future benefit of cheaper and more effective electrical operation of trains."

### Power for All

The Columbia River Valley has a kilowatt shortage now, but it is only temporary. When the river is fully developed, engineers on Dr. Paul Raver's staff claim that this abundant energy could electrify 9,510 miles of main-line transcontinental railroads, extending from the Santa Fe and Southern Pacific in the arid Southwest to the Great Northern and Northern Pacific in the "rain forests" of the Northwest.

Thomas M. C. Martin, 45-year-old electric-railroading expert of the Columbia River Power Administration, has announced that it would cost approximately 440 million dollars to order electric locomotives for all eight main-line railroads in the West. It also would cost 540 million dollars to string trolley wires and transformer substations along these routes. How would this investment of almost a billion dollars ever be justified?

### Investment Might Pay Off in 10 Years

To begin with, Martin says, the cost of Diesel engines would cancel out the money spent for electrics. Furthermore, he contends that it costs at least 50 cents less per locomotive mile to operate electric engines. Martin computes this as an annual saving of 50 million dollars on all western systems. Thus, he believes that in 10 years economies made possible by electrical operation would nearly retire the total expenditure for erecting the trolley network.

Of course, the Diesel enthusiasts have their answer to these claims. First and foremost, they insist that traffic density is not sufficient on such lines as the Denver & Rio Grande Western to warrant electrification. The electric advocates come back with the retort that the price of oil is going up while power rates have tended to go down to wholesale users.

And so the question remains. Western railroaders argue it in roundhouses, around caboose stoves, in repair pits and over coffee and apple pie in train crews' hotels. **END**



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and to restore  
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# OIL-CONTROL STARTS HERE

To stop oil-pumping, replace worn engine  
connecting rod bearings

When you dig down for the cause of oil-pumping, you'll usually discover worn engine bearings.

Worn main and connecting rod bearings lose control of oil flow. They can't meter the exact amounts of oil necessary for proper engine lubrication. Excess oil reaches combustion chambers, burns to motor-fouling carbon on spark plugs, valves, pistons and rings. *Performance goes up in smoke!*

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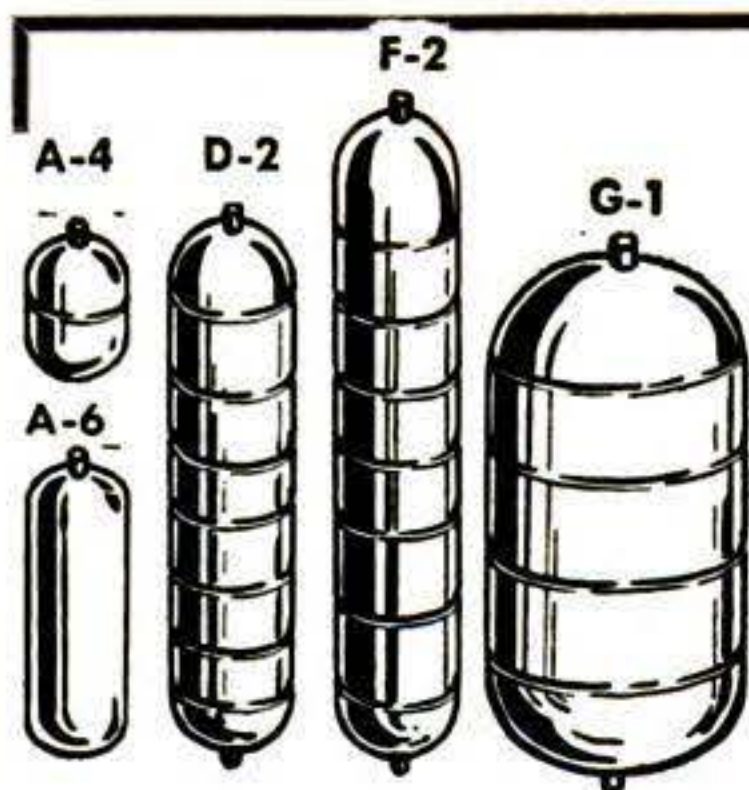
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F-2	Stainless Steel—New	45" x 6"	11	1000 cu. in.	9.50
F-2A	Carbon Steel—New	45" x 6"	11	1000 cu. in.	5.50
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**39.50**  
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FOR YOUR SUMMER POWER SUPPLY



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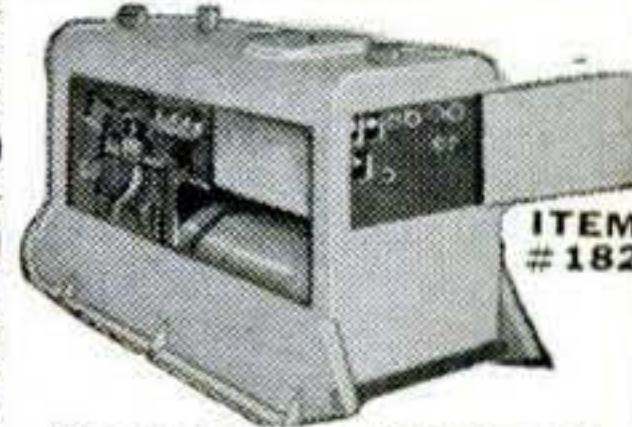
Oil filter. Quiet muffler. 6-volt starter, generator. • Hobart 115 volt, 60 cycle, 3,000 to 4,000-watt generator. Furnishes either single or three-phase power, 2 or 3 wire. • Panel contains oil gauge, voltmeter, ammeter, circuit breaker, voltage regulator, start button. Today's Cost Over \$1,200.00. SALE PRICE, F.O.B. Chicago... **465.00**

Item #178—350 watt—110 volt—60 cycle A.C. direct coupled to 1 cylinder Midco engine. Shpg. Wt. 116 lbs. F.O.B. Chicago... **125.00**

Item #182—Onan Generator—5KW—120 volt—60 cycle A.C. single phase, direct coupled to Ford 4 cylinder, water cooled engine with push button start, battery ignition. (Battery not included.) Shpg. wt. 1200 lbs. F.O.B. Chicago... **795.00**



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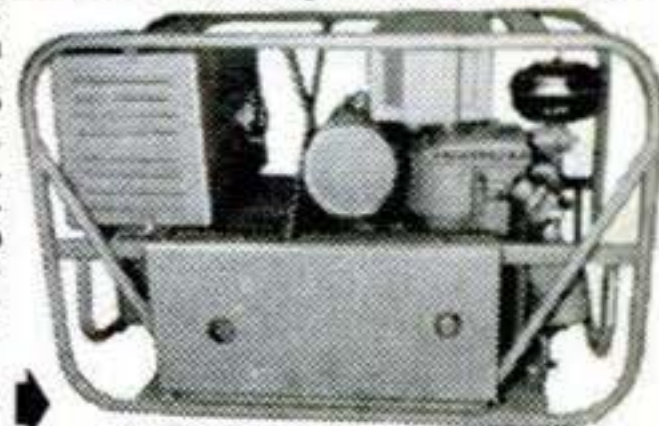
ITEM #182

Item #201—PE 95-G—10 KW—110/220 Volt 60 Cycle A.C.—Single Phase. Totally enclosed. Onan generator direct coupled to Willys Jeep 4 cylinder, water cooled engine, push button start. Instrument panel with engine and generator instruments, circuit breaker, controls, etc. Uses 6 volt car battery. (Battery not incl.) Skid mounted. Ship. wt. 1500 lbs. F.O.B. Chicago... **1295.00**



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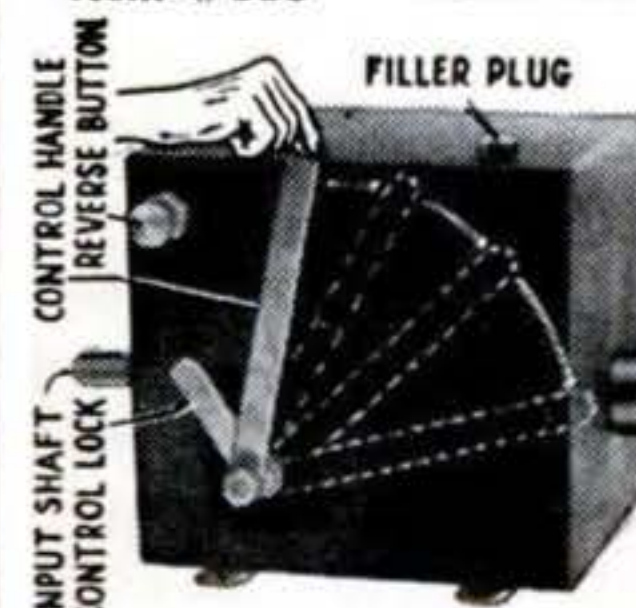
Item #199—Power Unit PE-99—7.5 KW—120 Volt—Single and 3-Phase—60 Cycle A. C. Master generator driven by a 4 cylinder, V-type, air cooled, Wisconsin engine with magneto ignition, push button start. The self-excited, drip-proof generator is driven from 5 parallel V-belts. Control panel contains engine and generator instruments, including circuit breaker, emergency start-stop buttons, volt meter, ammeters. Complete semi-enclosed unit mounted on steel skid. Weight 1885 lbs. F.O.B. Chicago... **945.00**



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ITEM #127—Double acting hydraulic cylinder. 1" bore, 1" stroke, 1/2" diam. shaft, 1/4" tubing thread ports. Over-all length closed—6 1/2". Clevis mounting at both ends. Perfect for clamping and feeding. Postpaid... **5.95**

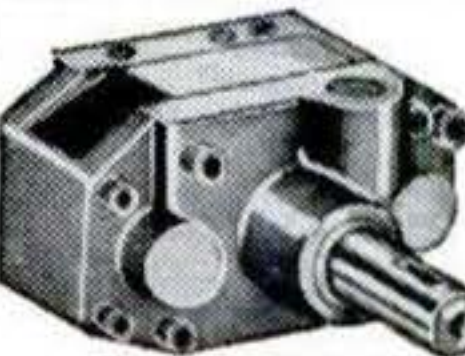
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## How Scientists Explore the Deep Sea

[Continued from page 130]

the Pacific—caused by the intermittent eruption of volcanoes just below the surface, only to be washed away by the sea when the volcano is dormant—are being charted. (During the war, one scientist suggested that Falcon, a particularly erratic volcanic isle in the Tonga Group, would be an ideal place to exile war criminals!) The age of the ocean floor is being determined by radioactivity tests of deep-sea deposits and from microscopic fossil remains found in the bottom sediment.

### War Stepped Up Pace of Sea Study

Military oceanography received a powerful impetus during World War II when the Joint Chiefs of Staff called upon Hydro for data on tides, winds and weather, landmarks, aids and hazards to navigation, for the planning of amphibious operations.

Experiments in underwater sound transmission helped develop new rescue techniques like Sofar (Sound Fixing and Range) in which sensitive shore listening stations picked up the explosion of a signal bomb dropped by survivors at sea, and fixed the survivors' position by triangulation. Water-transparency tests told submarine skippers how deep they must go to escape observation by hostile aircraft.


Global strategy focused attention on the Arctic and Antarctic and the distribution and drift of ice, the greatest hazard to navigation in high latitudes. Incidentally, there is enough ice in Antarctica alone to encase the entire globe in a layer 120 feet thick!

### New Science Has Endless Possibilities

In addition to its basic peacetime contributions to navigation and geology, oceanography is saving merchant shipping millions of dollars in time and fuel by guiding ships into the currents that speed them on their way. It is telling commercial fisheries where they are likely to find their best catch. It is furnishing data on winds and currents for long-range weather forecasting. It is pointing the way to eventual exploitation of the boundless mineral wealth in sea water, and to the sea's possible value as a larder to feed a hungry world when our land resources have been depleted.

Indeed the future possibilities of the youthful science of oceanography are as all-encompassing as the oceans that men are exploring at last.

END



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**FIRST... DRILL HOLE SAME SIZE AS THE MOLLY... THEN INSERT MOLLY**

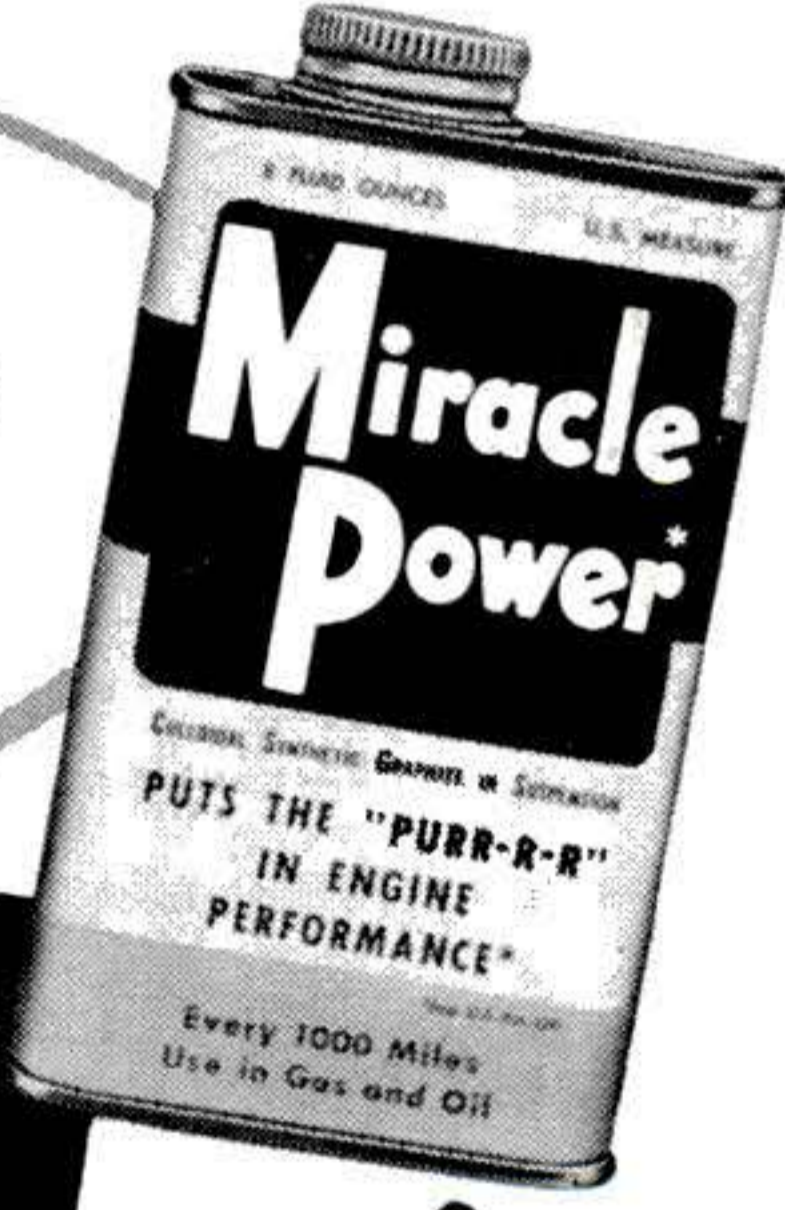
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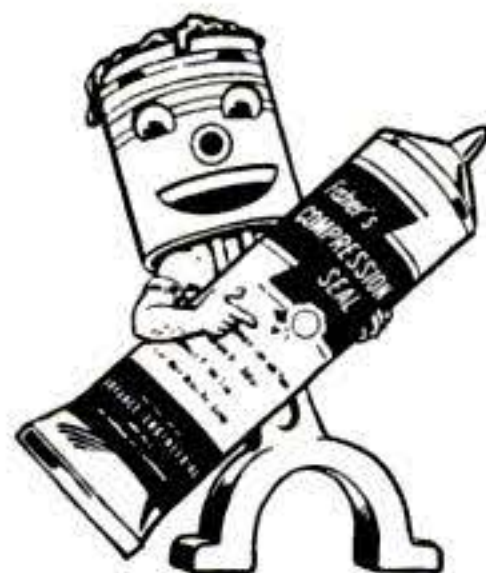
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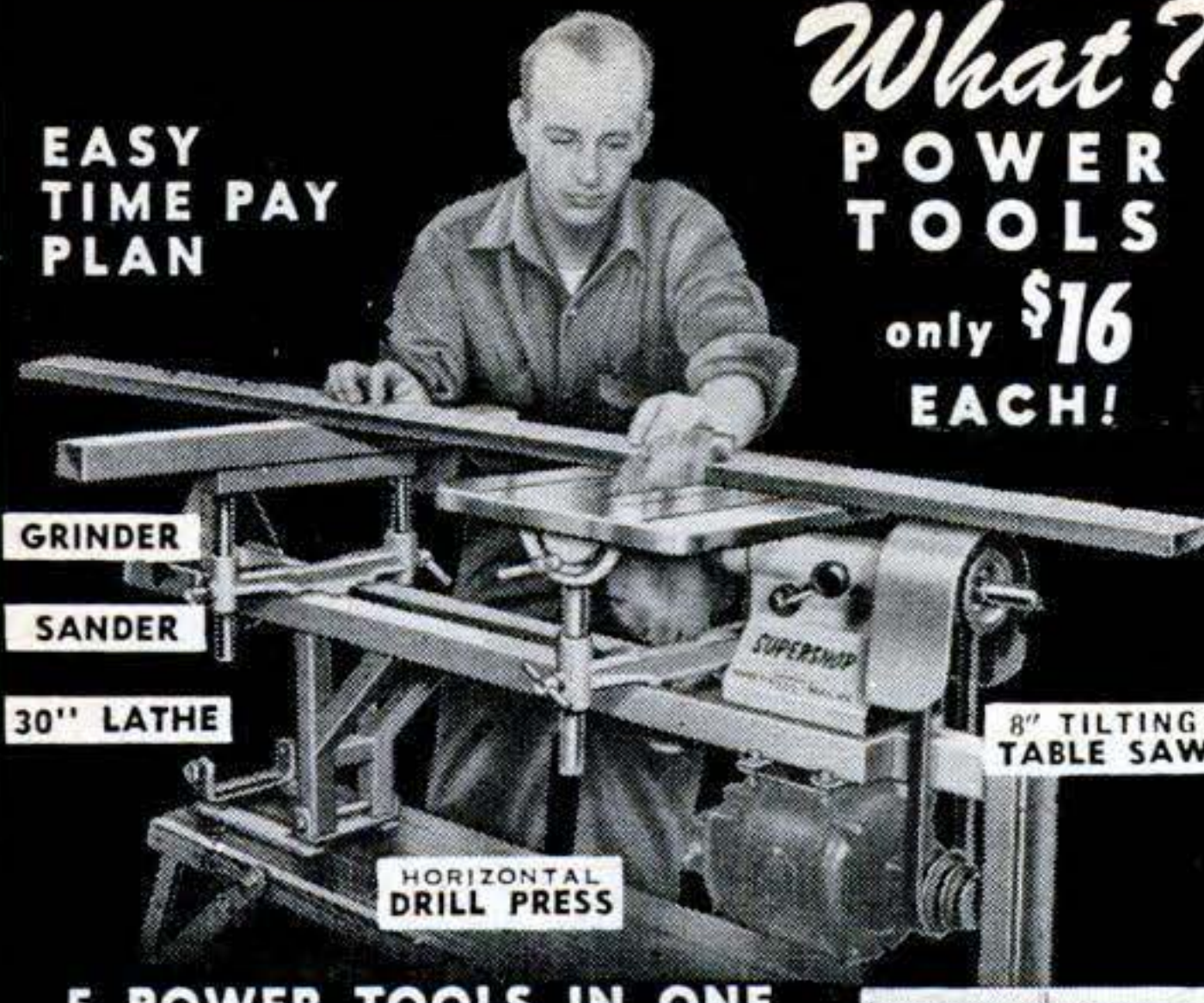
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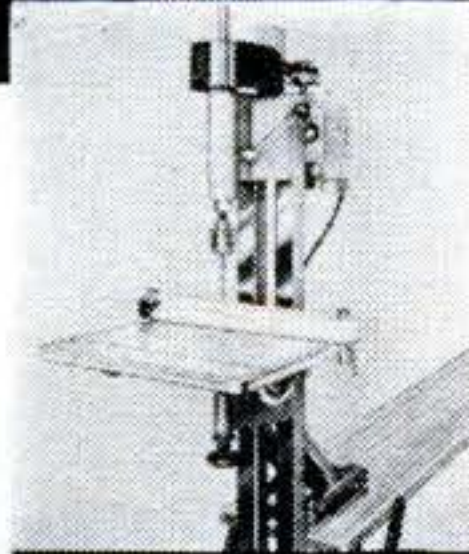
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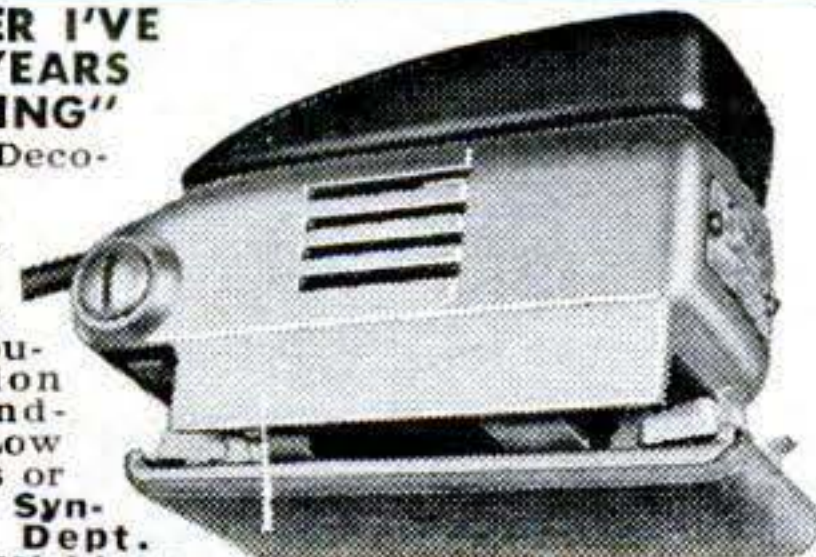
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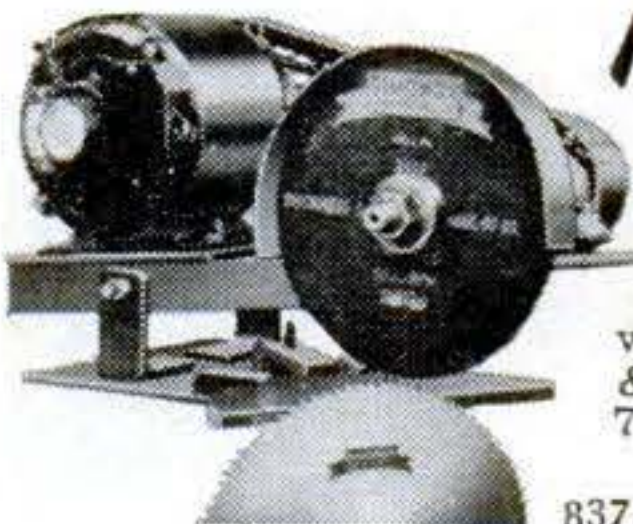


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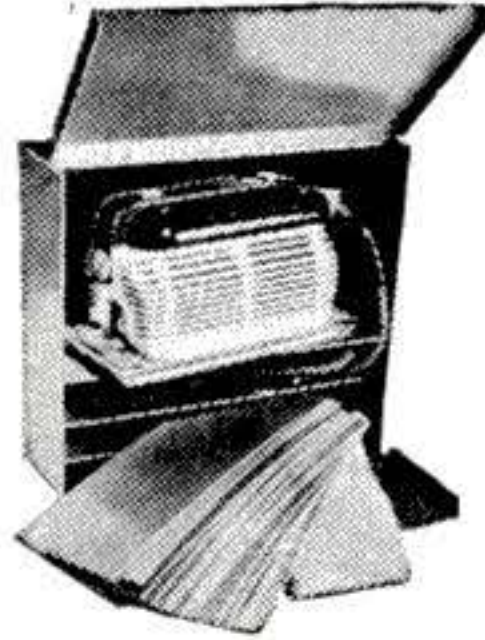
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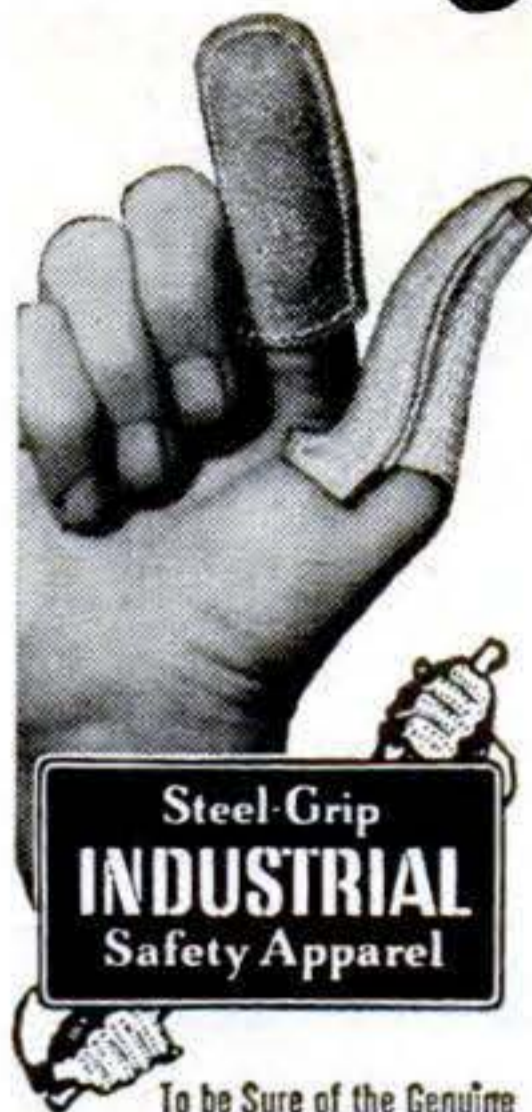
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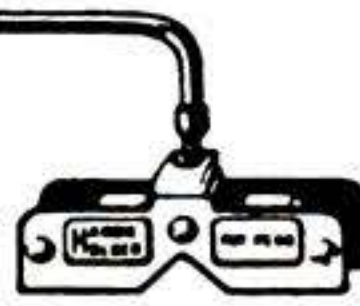


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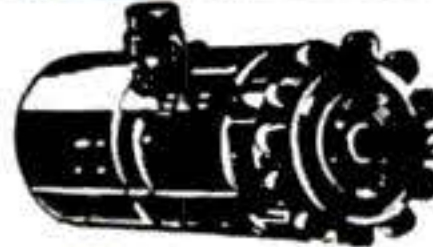


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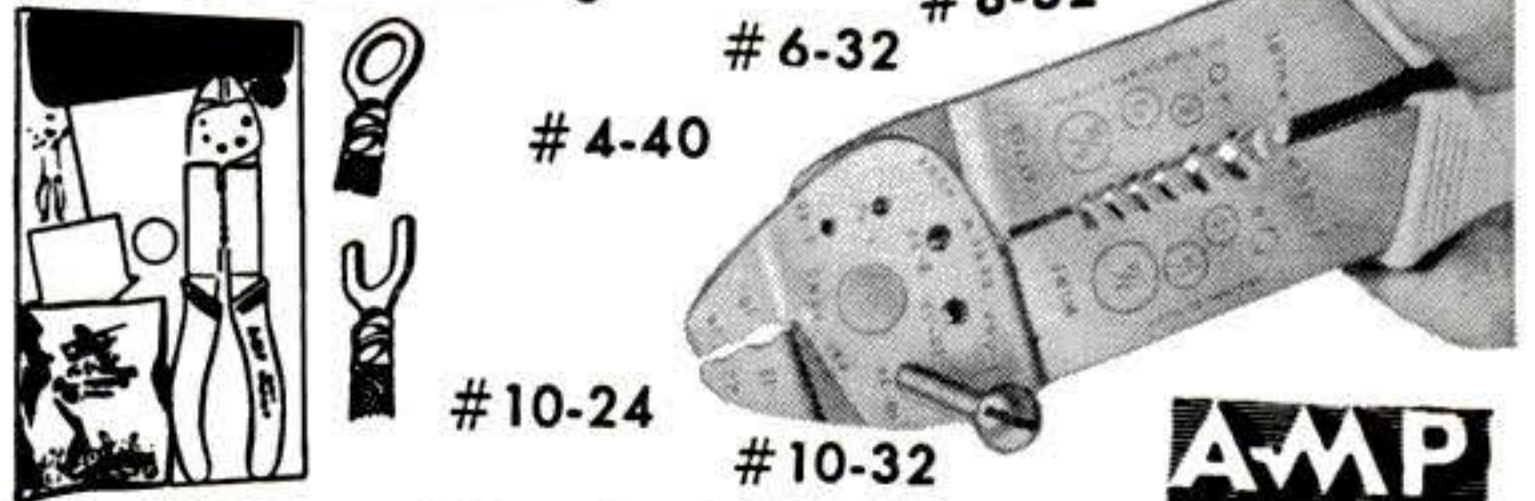
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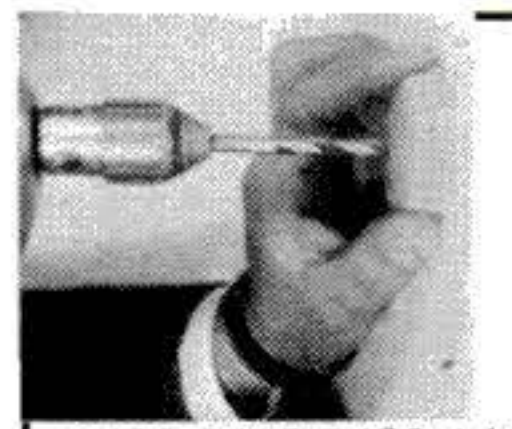
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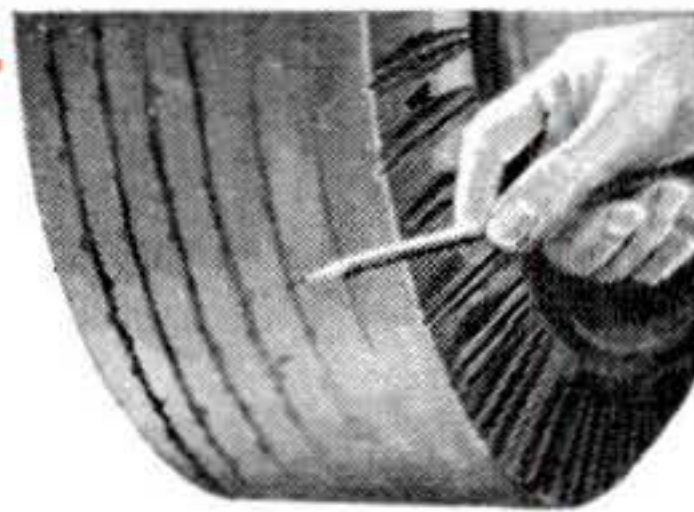
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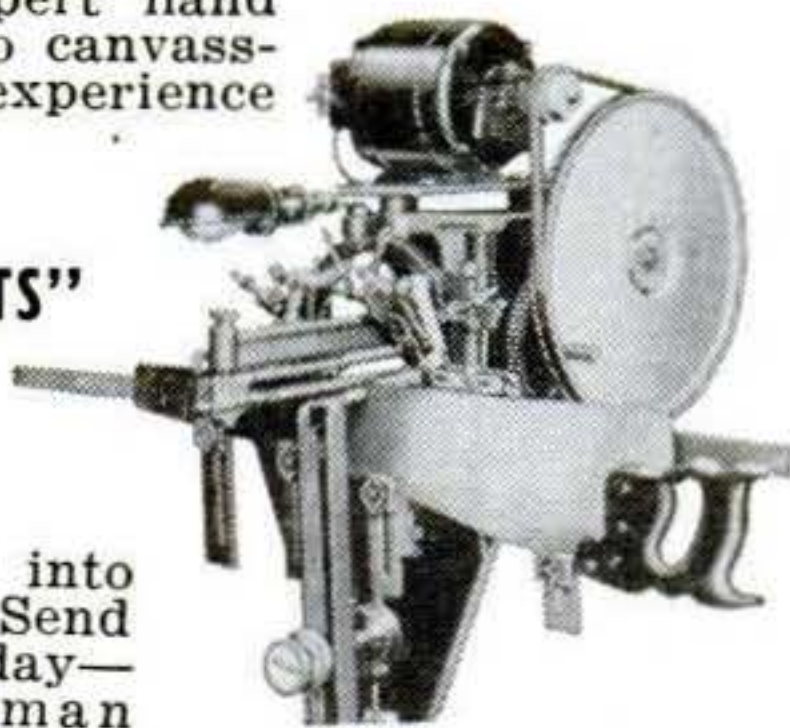
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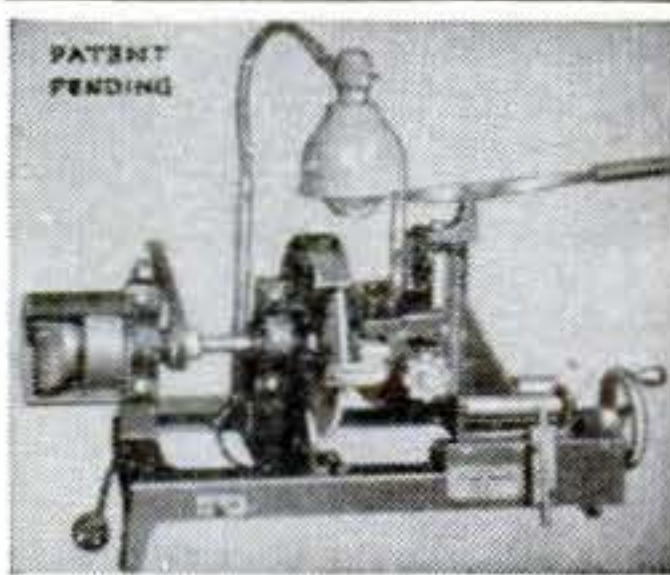
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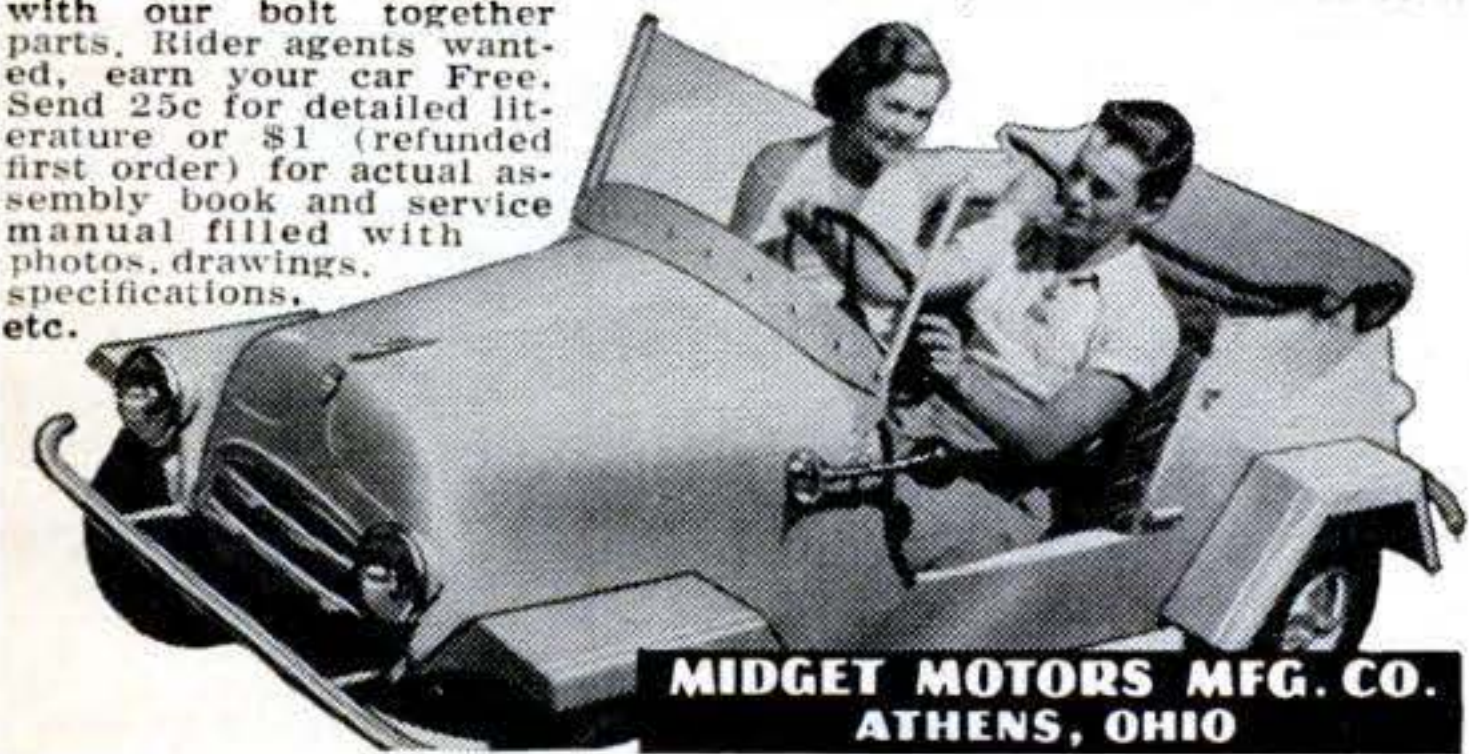
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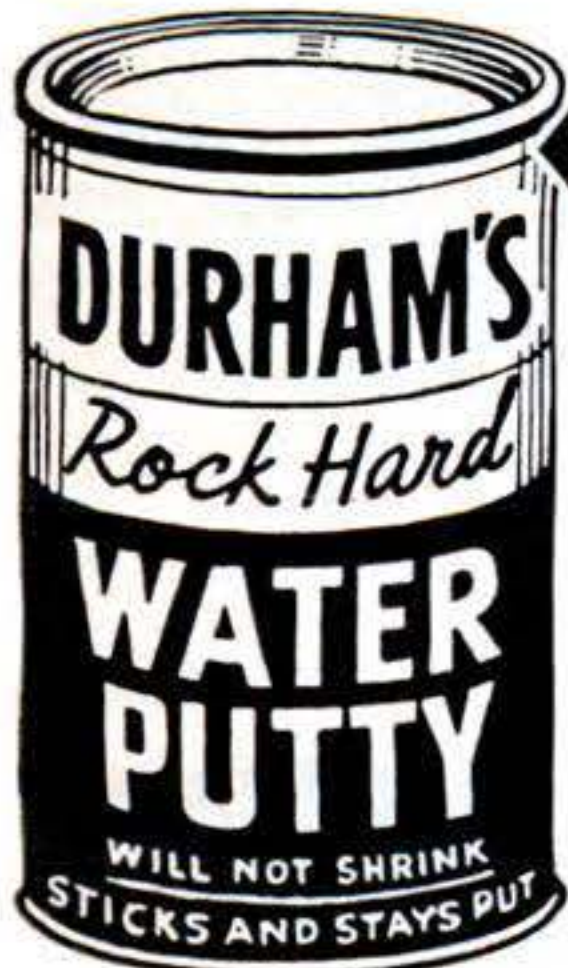
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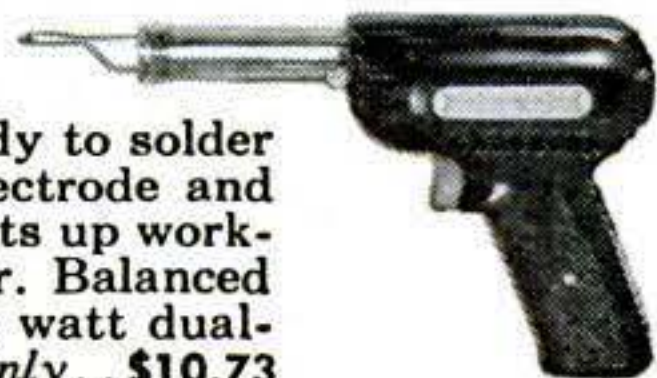
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Combination TV light and electric numeral-type clock. When placed on top of TV cabinet, helps reduce viewing eye-strain. Keeps accurate time. Walnut plastic case, 5 x 5 1/2 x 7 1/2". For 110 v., 60 cy. AC. Shpg. wt., 2 1/2 lbs. **78-328. Only . . . \$7.66**



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Sprays lacquer, paint, varnish, chemicals, insecticides, etc. No compressor needed—has motor right in handle—develops over 90 lb. pressure. Pistol trigger. With 25-oz. glass jar and 8-ft. cord. For 110-120 v., 60 cy. A.C. Shpg. wt., 5 lbs. **46-139. Only . . . . . \$9.57**



(All prices F.O.B. Chicago)

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**FREE Supplement**

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**833 W. Jackson Blvd., Chicago 7, Ill.**

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100% PURE LINSEED OIL

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Refinish, beautify, polish all woods. "101 Handy Hints." Send for today.

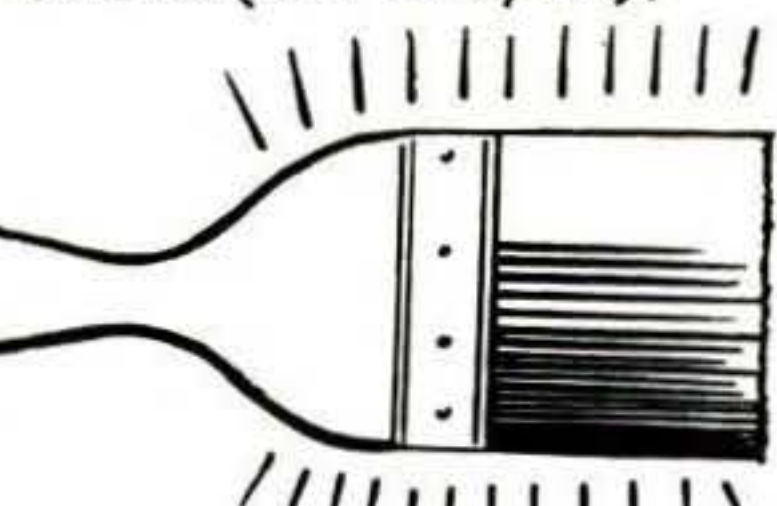
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## CLEANS HARD BRUSHES



- **SOFTENS** HARDEST brushes—usually in *minutes!*
- **CLEANS** out FRESH paint instantly! (Color changer.)
- **SAFE** for hands and bristles (hair or nylon)!



**Pint 58c ... Where You Buy Paints**  
Write for FREE Circular

Get the liquid paint brush cleaner for BOTH hard and freshly used brushes.

ANOTHER QUALITY PRODUCT BY  
**SAVOGRAN**  
25 Huntington Ave., Dept. 47, Boston 16, Mass.

FOR  
FASTER WORK  
IN HOME OR  
SHOP...

# HOLD-E-ZEE

The Original AUTOMATIC GRIP  
**SCREWDRIVERS**

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See these popular, high-quality drivers with the exclusive Gripper that holds, starts and sets up screws in unhandy places!

New Models FOR RECESSED HEAD SCREWS

At Leading Dealers Everywhere  
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Every set needs this special protection against damage by lightning and static! Your best TV insurance is our tested and guaranteed

### LIGHTNING ARRESTOR

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**\$2.50** POST PAID

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Our 510th Advertisement

## REAL DIESEL ENGINE

**\$2.95**

- for planes, boats, midget cars
- 7500 RPM; 1/7 HP; ht. 3 1/2"; wt. 5 oz.

● precision machined for smooth operation  
You just can't beat this price for a precision diesel engine! Streamlined, compact, easy to install. Thousands of satisfied users all over the world. Fast delivery if you ORDER TODAY! Send \$2.95 plus 25c postage.

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Only **\$27.50**  
other models to \$44.

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## Ball-Bearing SPEED WHEELS

**JUVENILE WHEELS** (No bearing, solid tires)

4" .....	40c	6" .....	65c
5" .....	45c	7" .....	75c

(Semi-pneumatic tire, ball bearing)

8 x 1.25.....	1.85	10 x 1.25.....	2.20
8 x 1.75.....	1.95	10 x 1.75.....	2.30
8 x 2 .....	2.20	10 x 2.00.....	2.65
		12 x 1.75.....	3.45

**INDUSTRIAL WHEELS**

Lug Base, Semi-Pneumatic tire			
5 x 1.75.....	3.65	10 x 2.00.....	6.10
6 x 2 SW .....	3.45	10 x 2.75.....	5.15
6 x 2.00.....	4.00	12 x 2.00.....	6.90
8 x 2.00.....	5.20	12 x 3.00.....	9.20
8 x 2.50.....	5.40	16 x 4.00.....	15.15
Smooth Base, Pneumatic tire and tube			
8 x 3.00.....	11.00	12 x 4.00.....	12.10
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Available Now—CASTERS  
Write for circulars on all wheels.  
No c.o.d. orders. Prices F.O.B. our plant.

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# SURPLUS MACHINE SHOP TOOLS AT PRICES YOU CAN AFFORD

**SET 7B** 12 Different Size H. S. Straight Shank Drills. 1/4" to 1 1/2", lengths up to 7" Ppd. Only **\$3.98**

**SET 8B** 10 different size H. S. Straight Shank Drills. 1/4" to 1", extra long. \$40 value. New and slightly used surplus. Ppd. **\$6.95**

## HIGH SPEED MORSE TAPER SHANK DRILLS

**SET 9B** 15 Different Size High Speed Morse Taper Shank Drills up to 9/16" with No. 1 and 2 tapers. New and used. \$50 value. Priced at only **\$6.49**

**SET 10B** 20 Different Size High Speed Morse Taper Shank Drills from 1/4" to 1". New and used. \$70 value. Priced at only **\$12.95**

**SET 15B** 10 Different Size High Speed Morse Taper Shank Drills from 1/2" to 1 1/4". New and used. \$50 value. Priced at only **\$9.95**

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**SET 4B** 5 different size cutters. Can be used as mounted milling cutter or circular saw. All with 3/8" and 1/2" shanks, widths up to 1 1/4", dia. up to 1". New and used. Ppd. **\$3.95**



**400-GPH VANE-TYPE PUMP:** Positive displacement type, built-in relief valve, adjustable up to 200 lbs. PSI. 1/2" drive spline shaft, 1" pipe conn. Rotates either direction. Ideal for use as fuel pump, irrigation, cattle spraying, only... **\$4.98**

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**MILLING CUTTER MIX:** Assortment of 4 various size H. S. milling cutters, all with 1" arbors; up to 3" dia. only **\$3.98**

**NEW ROTARY FILE MIX:** 7 different size H. S. files, 1/4" shanks. New cost as high as \$2.00 ea. Only **\$4.49**

**FILE MIX—BRAND NEW:** Set of 12 different files, lengths 6, 8, 10, 12 in. Half rounds, bastards, knife, mills, etc. First line Nichols, Heller and other brands **\$3.49**

**GRINDING WHEEL MIX:** 30 grinding wheels with 1/4" arbors, up to 3" in dia., plus mandrel, only **\$3.29**

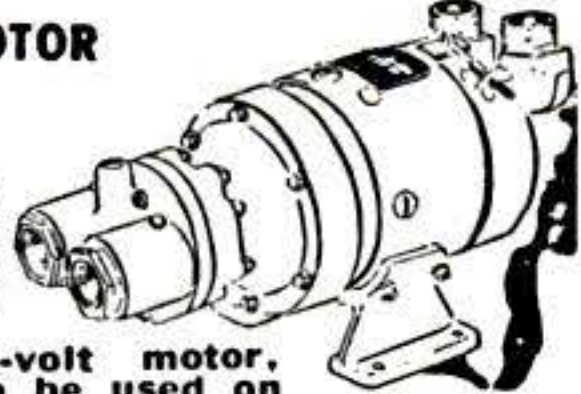
**SURPRISE MIX:** Over 50 pcs. for your 1/4" elec. drill including rotary files, drills, bits, reamers, grinding wheels and arbors for our customers who like pleasant surprises. Your money back if you aren't satisfied **\$2.98**

**1/4" to 1/2" H. S. DRILL MIX WITH 1/4" SHANKS:** 10 different size new and used hits, only **\$4.95**

**1/4" SHANK POINTED STONES:** Mixture of 12 **\$2.95**

## PUMP AND MOTOR

Pump has 1" connections, built-in relief valve, adjustable up to 1500 lbs. Max. capacity 6 Gr. 1 1/2 H.P., 24-volt motor, 4000 RPM. Can be used on 12 or 36 volts. 500 units available at quantity discounts. Wt. 20 lbs. **CLOSE OUT AT \$9.98**

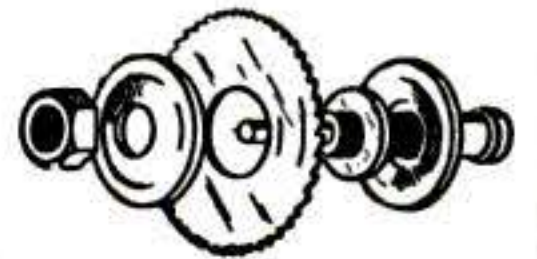


**Money Back Guarantee—All Mdse. Mixture of New and Reconditioned Unless Specified New. ALL ITEMS (EXCEPT THOSE SPECIFIED POST PAID) WILL BE SHIPPED F. O. B. TULSA—OR, ADD 10%, AND WE WILL SHIP YOUR MDSE. PPD.**

Write For Free Catalog Describing Thousands of Bargain Cutting Tools.

## 6 Slitting Saws with Mandrel

**SET 34B** 6 Different Size High Speed Slitting Saws, 2 3/4" dia. x 1" arbor. Thickness from .040 to .071. Cuts wood, aluminum, brass, steel, etc. **PLUS SPECIAL MANDREL** which enables use of saws in 1/4" or 1/2" elec. drill. \$25 Value. Ppd. Only **\$4.95**



7 selected, sharp H. S. Slitting Saws as above to use on your own mandrel or milling machine. New and used. Ppd. **\$4.95**  
A bargain at.....

## HIGH SPEED STRAIGHT SHANK CHUCKING REAMERS

**SET 16B** 20 Different Size High Speed Straight Shank Chucking Reamers up to 1/2". New and used **\$7.95**  
Priced at only.....

**SET 18B** 15 Different Size High Speed Straight Shank Chucking Reamers from 1/4" to 1". New and used. Priced at only **\$6.95**

**H. S. TAPS:** Slightly used surplus. Your choice of the following sizes: 5/16", 3/8", 7/16" NC or NF. PPD. ea. only **26¢**

**GRINDING WHEELS:** 8"x1/4"x5/8" arbor aluminum oxide resinoid 1.20A75.....ea. **75¢**

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**T & T TOOL** 221 W. SECOND TULSA, OKLA.

## WHAM-O SPORTSMAN

**\$1.50** 35-LB. PULL!

HITS LIKE A .22 RIFLE—KILLS RABBITS, SQUIRRELS. Powerful, silent, accurate. For hunting, target, routing pests. Sportsman's choice sold world over!

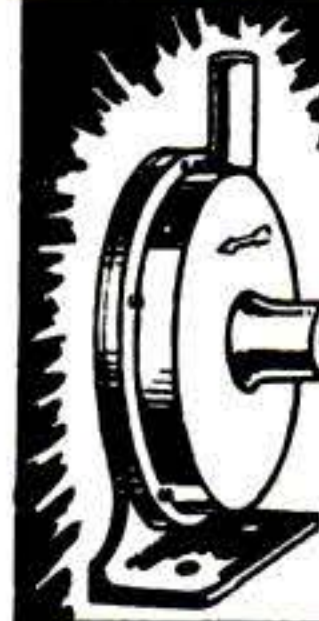


### HUNTING SLINGSHOT

Heavy duty 7" ash stock. 40 steel balls, extra rubber, target. **GUARANTEED.** At dealers, or send \$1.50 to **Wham-O Mfg. Co.** Box 88, South Pasadena, Calif. \* Professional model of Nat'l Slingshot Assn.

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**DRAIN WASH TUBS, CELLARS, CISTERNS IRRIGATE—FILL TANKS—DRAW WELL WATER**



Pumps 2800 GPH. 420 GPH at 75' High or 1600 GPH from 25' well. Sturdy, Rustproof Alloy Metal. Six Blade Impeller. Uses any 1/8 to 1/2 H.P. Motor Will not leak or clog. Fits any garden hose. Immediate **895** Money Back Guarantee. Send Check, M O, or C.O.D. **U S**

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Goes anywhere! Trailer type gas drive welder.



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PS-3

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Name.....  
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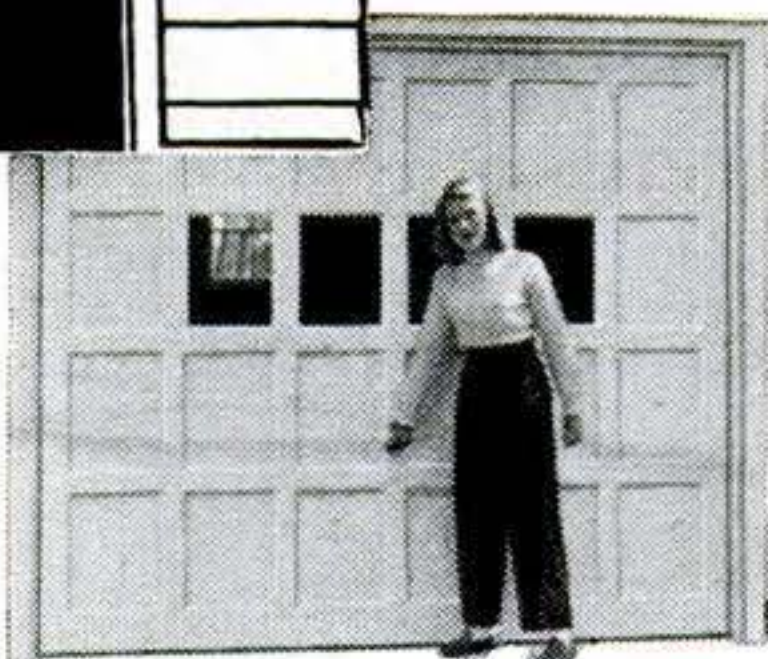
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DOOR...**

**SAVE MONEY!**

**WORK FROM A  
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— STEP-BY-STEP  
DIRECTIONS**



With Easi-Bild\* Build It Yourself Pattern No. 86 you can have a garage door with Stanley Swing-Up Hardware — for less than 1/2 present costs! Pattern tells what materials to buy, where and when each is used. No special tools or skill required. Install the Stanley Garage Door Set with hand tools.

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Enclosed is 50c in Coin, Money Order, Check for Single and Double Garage Door Pattern No. 86.

Please send Simplified Directions for installing

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Name.....  
Address.....  
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Yet Almost Invisible.  
Now Made  
for YOUR HOME!



**"SAFETY-SET"**

T. M. REG. © 1948

Metropolitan police expert says, "Inadequately secured windows with old fashioned, conventional 'locks,' account for 90% of all burglaries!"

**YOUR HOME?** Have you experienced the terror and despair of a wrecked and rifled home? Valuables gone, wanton destruction in the wake. If you have, don't let it happen again! If you haven't, protect yourself now!

"SAFETY-SET," the latest miracle of modern crime prevention, consists of two powerful, slim (almost invisible) inserts of finest steel—scientifically heat-treated to withstand 90,000 (45 tons) lbs. pressure per square inch. Yet you can install a set (two per window) in less than three minutes. Windows lock closed, or five inches open.

**ENJOY YOUR SLEEP**—spend week ends away, vacations in perfect peace of mind. Once "SAFETY-SET" is installed, the strongest burglar on earth can't pry his way into your home. "SAFETY-SET" IS A SPLIT-POSITIVE LOCK! THE ONE LOCK all burglars respect.

Send check, cash or money order for **this special offer: 6 SETS POSTPAID... \$1.95**

(complete instructions included—additional sets (per window) 30c ea.)

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**DO IT EASIER --- FASTER --- BETTER**

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"DU-ALL"

**Walking or Riding Tractor**

Plow  
Plant  
Cultivate  
Mow  
Rake  
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Saw Wood



1 1/2, 2 1/2, 3 and 5 H.P. walking tractors for all large and small gardening. 5, 8 and 12 H.P. riding models that will handle good sized farms. Quality built for 50 years. All

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Also Complete plans for Crackerbox Runabouts.

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Make your own castings of aluminum, copper, bronze, silver. Foundry sets are available in three sizes including 2400 Deg. F. blast Furnaces. \$22.50; \$29.50; and \$42.00. f.o.b. Kansas City. Free Circular.

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KANSAS CITY, MO.

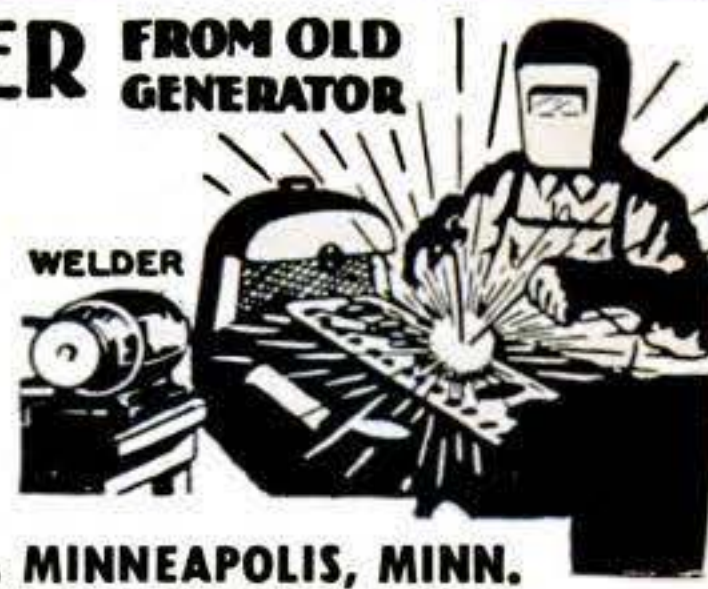
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Light or Heavy Work

Produces 75-200 amperes. Takes no previous experience or hard work to make one of these welders. Complete plans 35c. Send for your **PLANS** today and we'll include **FREE** our Big NEW Catalog listing hundreds of electrical bargains.

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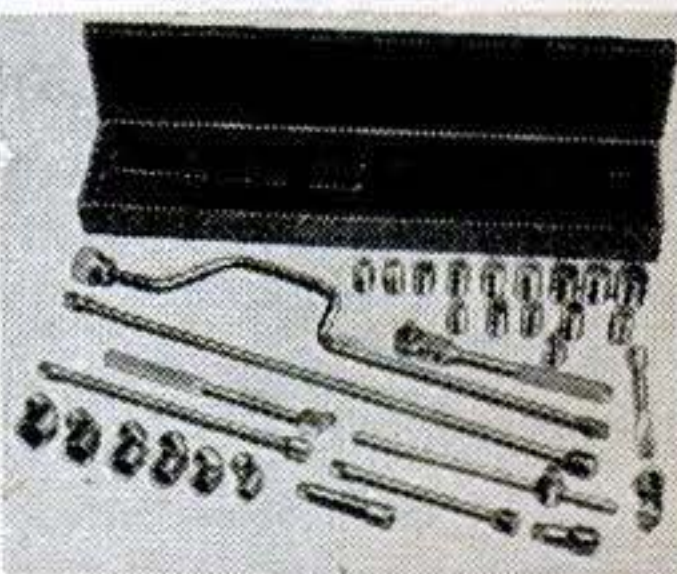
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for tools of this quality. Pay **EASY MONTHLY TERMS**

**WRITE TODAY FOR FREE CATALOG**

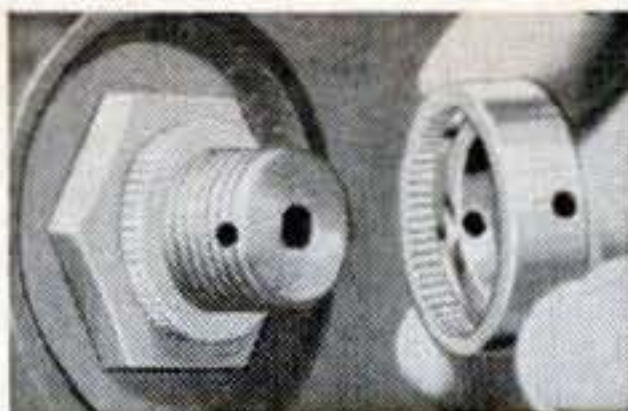
**MECHANICS CO-OP**

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# 5,000 MORE MILES From FRONT TIRES

**"Educated Nut" Stops  
"Scuffing"—FREE TRIAL!**



Long used by truck fleets (200,000 now in use) the "Educated Nut" is now available for all passenger cars. Allows you perfect adjustment on front wheel bearings every time. Replaces front wheel bearing nuts now on your car. When you "back-off" your present front wheel bearing nuts to insert cotter pin, you loosen your bearing adjustment enough to cause as much as 3/8" wobble on the tread. This causes "scuffing" and "snaketracking", costs you speed, rubber, gas, brakelining and \$\$\$\$\$.

### THE EDUCATED NUT

- Adds up to 5,000 miles more tire life
- Stops bearing breakage
- Makes steering easier, safer
- Increases brake efficiency, stops 90% of all brake squeaks

### HOW TO INSTALL

Screw threaded piece up to perfect adjustment (turn up tight, then back till wheel revolves free). Then line up cotter pin holes in cap with hole in spindle. Snap on steel cap, insert cotter pin. You never "back-off" more and destroy adjustment to insert cotter pin as with old style nuts.

**FREE TRIAL**—Send no money. Just send name and address, make and year of car. A complete set of "Educated Nuts" (2 nuts, 2 caps, 2 pins) and instructions will be sent postpaid. Install and try. Feel the difference in driving immediately! Within two weeks, either return the complete set at no obligation or send just.....

**\$2.98**

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5024 Lankershim Blvd., No. Hollywood, Calif.

EASY TO WORK WITH!

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DO IT YOURSELF AND  
**SAVE 50%!**



Your money back if you aren't satisfied with the perfect Foam Rubber! Re-cushion chairs, make your own pillows, mattresses, chair-pads, cushions! You'll save up to 50%—because you buy direct! **SEND FOR FREE PRICE LIST.** No C.O.D. Add 10% for postage and handling.



Shaped to fit  
**AUTO SEAT TOPPER PADS**  
**FOAM RUBBER**  
24x60x1 1/2" \$6.45  
**MATRESS TOPPER PAD**  
38x75x1" \$17.95

16 x 16 x 1 1/2"	\$1.30
16 x 20 x 1 1/2"	1.65
18 x 24 x 1 1/2"	2.00
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24 x 24 x 1 1/2"	2.95

All sizes approximate

## ADAMS FOAM RUBBER

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DEPT. PS-6



Install in 60 seconds  
**SCREWS IN LIKE A LIGHT BULB!**

So easy! Just unscrew present light bulb from socket and replace with this fixture. U.L. Approved.

**IT'S NEW! Circline 22 Watt Fluorescent Light Fixture** **\$7.95** Post-paid

Circline lamp included. White enamel finish. Ideal for kitchen, bathroom, hall, playroom, workshop, etc. Diameter 9 3/4 inches. Gives lots more light than incandescent for less current. Satisfaction guaranteed. Order today. Send check or M.O. to Dept. B Pleasant Valley Dist. Co., P.O. Box 383, Park Ridge, Ill.

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**BUY from C&H**  
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Extra soup and go at a price you can't afford to miss! Mfr'd. by Borg-Warner. Specifications: 7 1/2" deep, 7" high. Wgt. 17 lbs. Compact and sturdy. 4 base mounting holes, 3/4" outlet, 5/8" shaft with female Lovejoy coupling. Priced today at \$85. Our special SALE PRICE ..... **\$31.00**

### Surplus Aircraft Recognition Slides

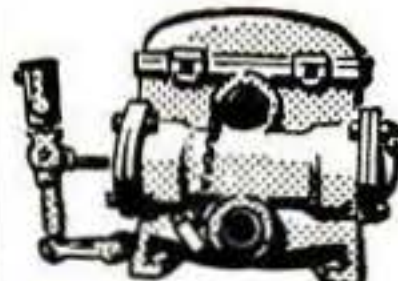
Air Force aircraft recognition slides. Fighters, bombers, etc. Boxes of Jap. German, British and American planes. Introductory offer of 25 slides, Only 98c, 60 slides for \$1.95. With orders of 100 slides at only \$2.95 we send you a pocket size Mini-Viewer worth \$1.25 FREE!



**98c**

### BRASS HAND PUMP

Double acting—pumps on forward and return strokes. Capacity 1000 gal. per hr. \$48 value, only ..... **\$18.50**



### ALARM HORNS

and Sirens. 110 v. AC motor driven. Heavy duty with long life and adjustable tone—high, med. and low. List \$47. NEW ..... **\$19.95**



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300 Watt 110-220 volt AC. Wgt. 40 lbs.—portable \$99  
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2500-3000 Watt 110v. AC Slow speed (1800 rpm) Leland generator for longer life. Recond'nd and fully guaranteed \$295. NEW \$345  
Plants built in 1951 with tools & spare parts, \$426  
5 KW Plant. 120 volts, 60 cycle AC. List today \$1910.00. Used \$675.00. NEW. Your price only **\$895.00**



### 54 to 1 BOSTON Speed Reducer

Reduces speed of ordinary 1750 rpm electric motor to 33 rpm. Lists at \$55.00. Our price ..... **\$29.50**

### 80-1 ratio Gear Reducer

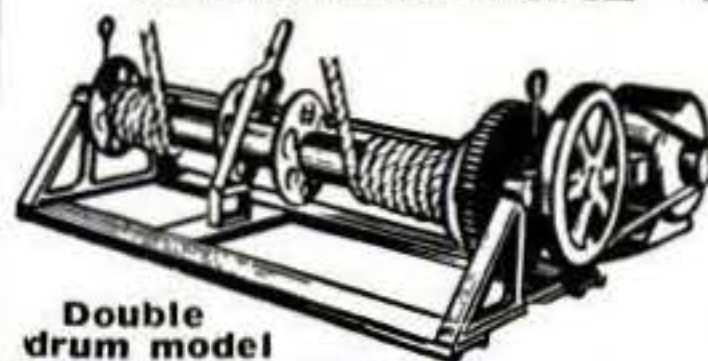
Double reduction, reduces 1/8 to 1/2 HP electric motor's 1750 rpm to 22 rpm. Reg. \$45.00. NOW... **\$22.00**



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Long wearing GOOD-RICH 2 ply 2" I. D. 25 ft. lengths worth \$25. Only **\$4.95**. 3 lengths as for \$12.00

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Double drum model

**WINCHES**, 1,000 lb. capacity. Hand operated ..... **\$12.95**  
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**CABLE**, 1/4" preformed stainless steel aircraft; 100 ft. or less, 17c per ft.; over 100 ft., 15c per ft.

FOR — CONTRACTORS, BOATS, FARMERS, TRUCKS, LOGGERS, etc.



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- Pumps
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## C&H ELECTRIC MACHINE Co. Inc.

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## Every Car Needs Sensational New Car HUSH Hoodliner\*

\*T. M. Reg.

Miracle Fibreglas\*\* hoodliner eliminates 80% of motor noise. In new or old car, you'll be amazed at greater driving comfort. Car HUSH also insulates engine — helps prevent condensation. Is fireproof.

Only \$5.75 at dealers and stations everywhere. \$5.95 Denver West.

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YOU'LL LIKE YOUR CAR BETTER WITH Car HUSH Hoodliner!

★ Easy to Install  
in 10 minutes  
only \$5.75

\*\* (Reg. Pat.) of Owens-Corning Fibreglas Corp.



The NEW Model 50 UTILITY TESTER  
**FOR REPAIRING ALL ELECTRICAL APPLIANCES-MOTORS**  
*an all-around electrical trouble shooter*



- Measures A.C. and D.C. Voltages, A.C. and D.C. Current, Resistances, etc.
- Will measure the current consumption while the appliance under test is in operation. The appliance or utility may be plugged directly into the front panel receptacle. A special pair of insulated clip-end leads is included for motors, etc.
- Incorporates a sensitive direct-reading resistance range which will accurately measure all resistances commonly used in electrical appliances, motors, etc. This range will enable continuity checks and tests for shorts and opens.
- Will test thermostats, radio tube filaments, bulbs, fuses, fluorescents, condensers, switches, field coils, circuit breakers, lighting systems, etc.

Handsome round cornered molded bakelite case 3 1/8" x 5 7/8" x 2 1/4". Complete with all test leads and instructions.

**\$13.90**

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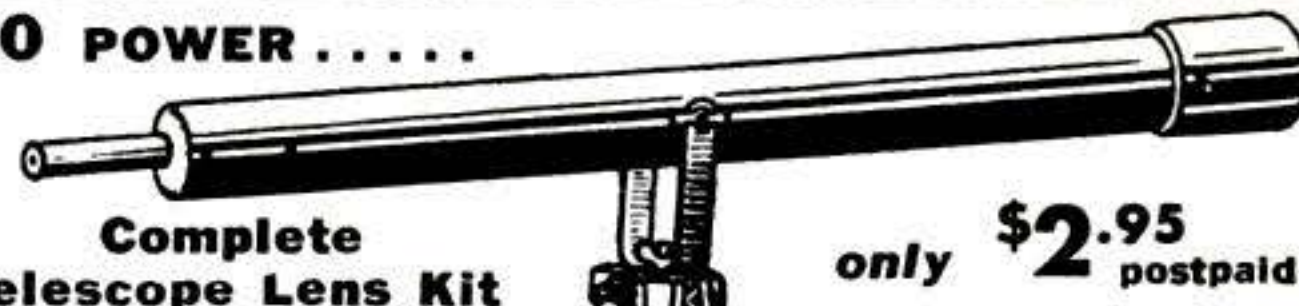
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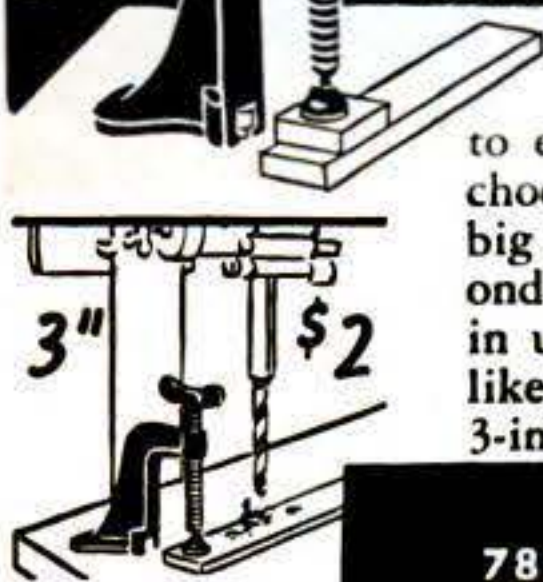


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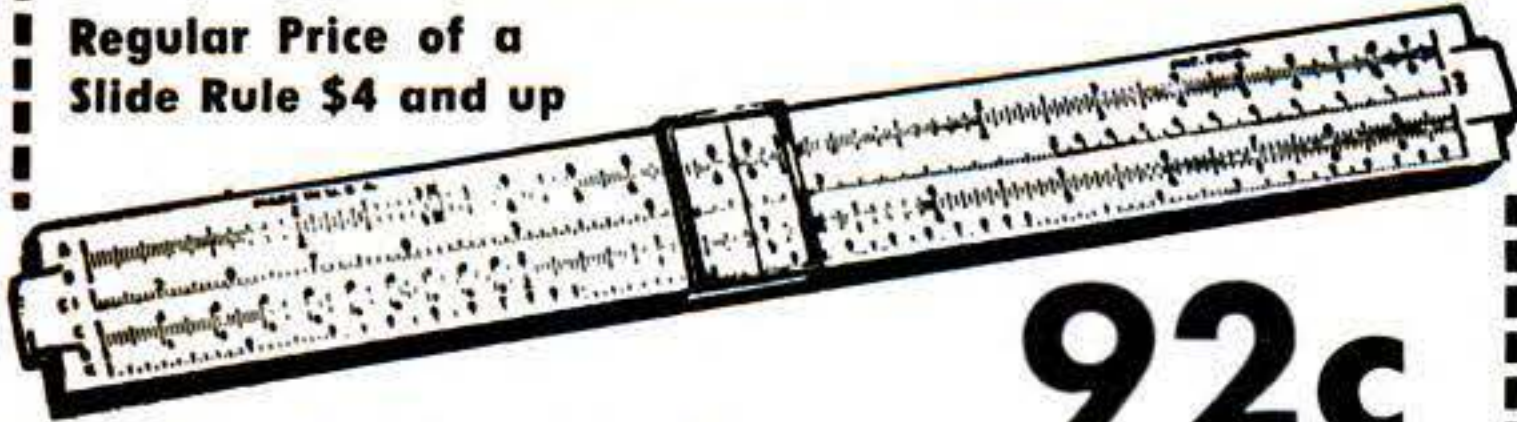
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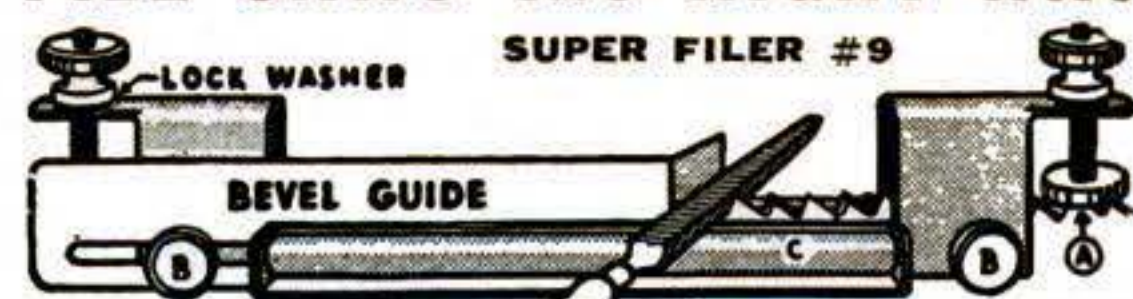
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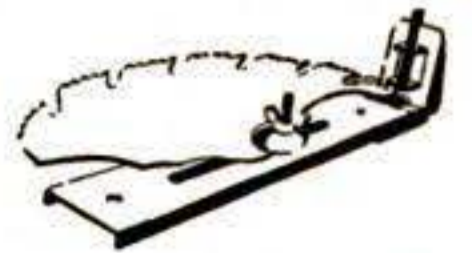


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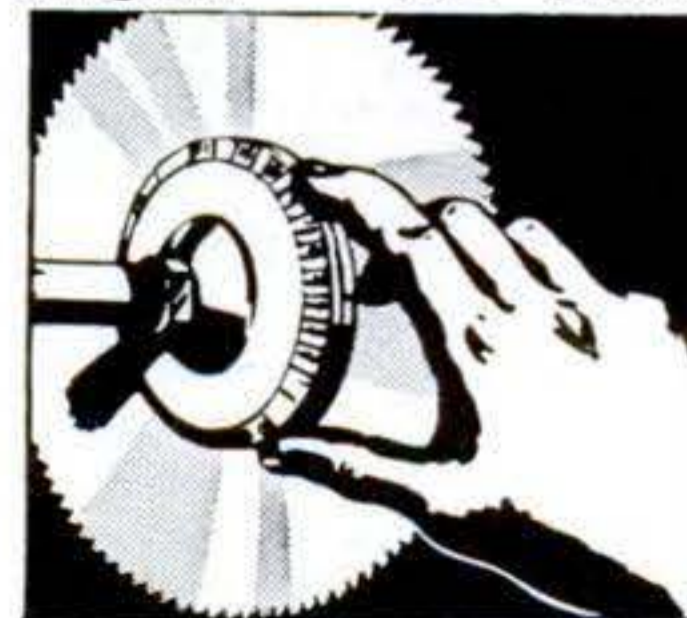
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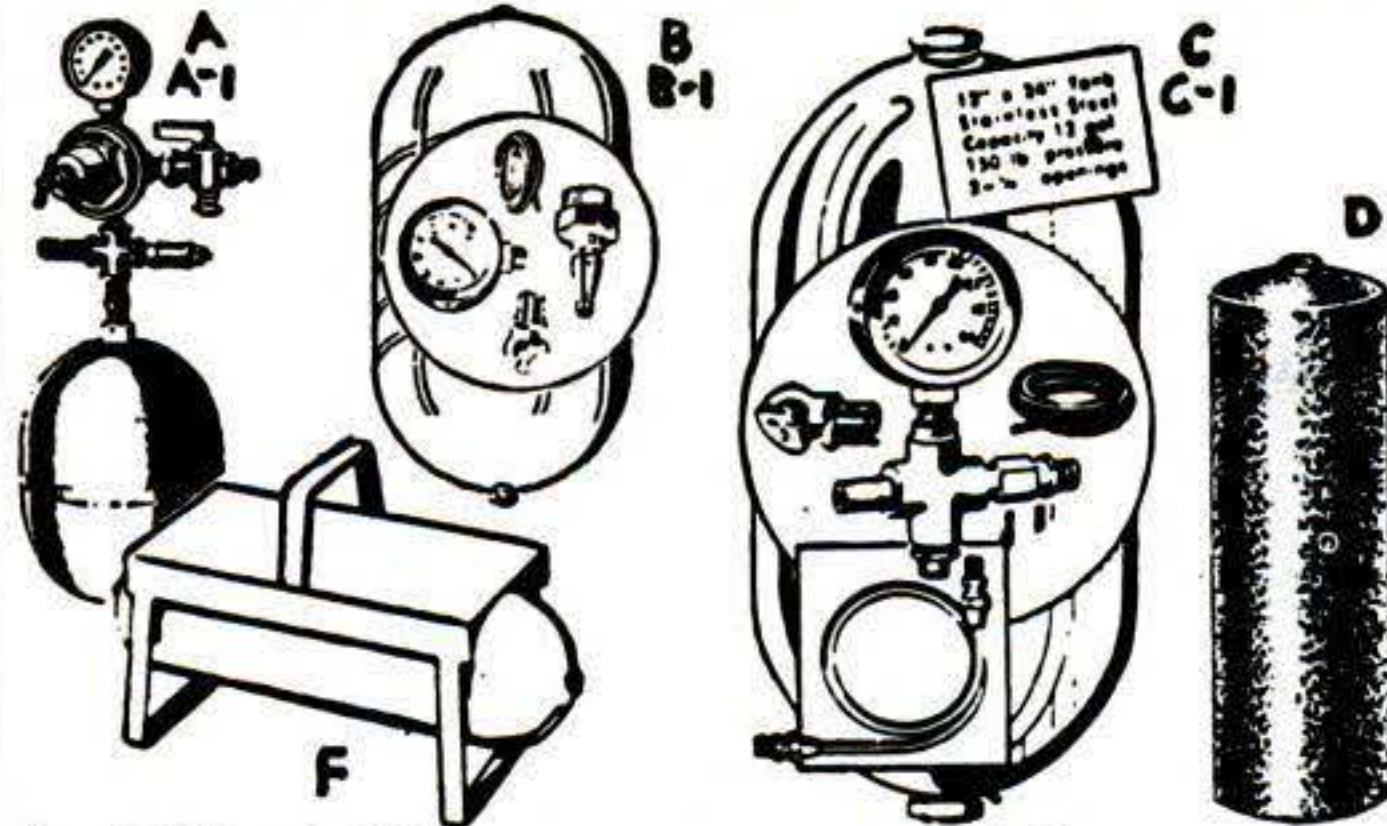
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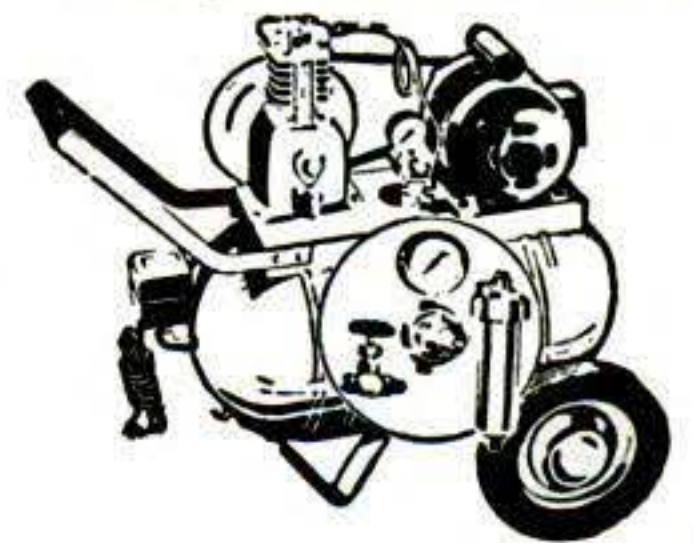
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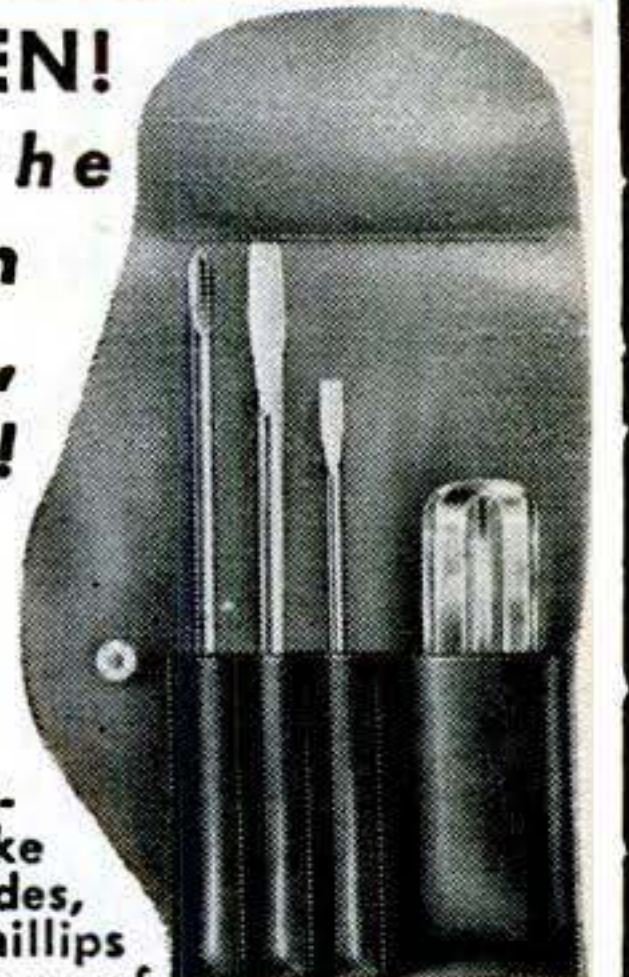
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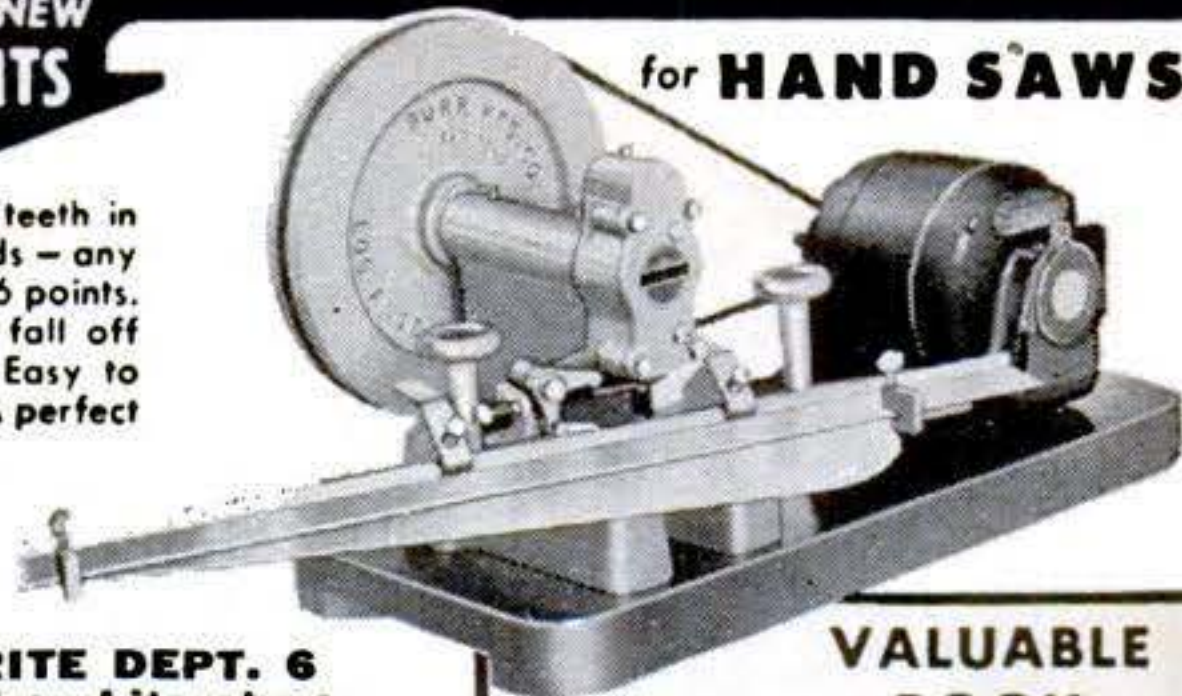
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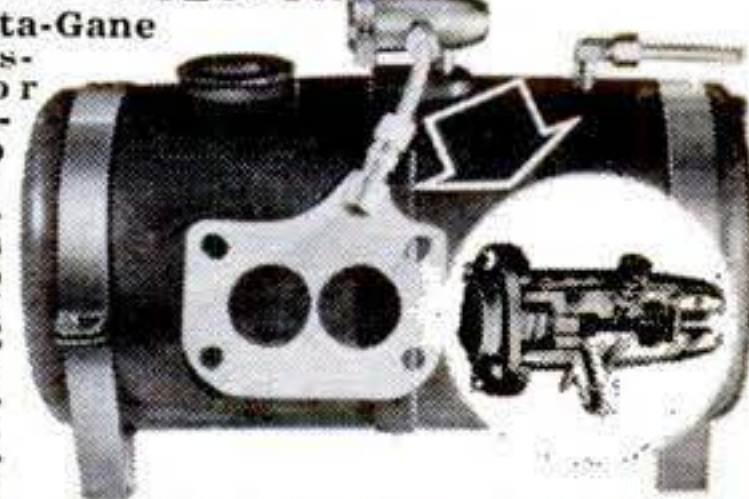
Soak them in CABOT'S BRUSH CLEANER. Smacks out  
hardened paint, varnish, right down to the heel... leaves  
bristles soft and pliable, just like new. Economical—can be  
used over and over. Non-inflammable. Buy Cabot's  
Brush Cleaner from your dealer or send \$0.85 for a  
pint or \$1.30 for a quart to Samuel Cabot, Inc.,  
663 Oliver Bldg., Boston 9, Mass.

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### With The OCTA-GANE INJECTOR

The famous Octa-Gane  
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"The gasoline mileage of high compression automo-  
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**VENICE, CALIF.**



# SUNGLASS SPECIAL

Genuine ARMY AIR FORCES



**SUNGLASSES**  
HERE'S THE REAL McCOY!

ARMY AIR FORCE 6 base, Precision Polished & Ground, Glare-free color lens with leather case to be attached to belt. Gold plated adjustable frame. Pearlized sweat bar and pads. . . . . NOW ONLY **475**

## AIRFORCE TYPE SUNGLASS



Ground & polished processed glass lenses. Gold plated frame with Pearlized sweat bar and nose pads. Cable ear pieces, simulated leather case. ONLY **195**



AVIATORS (AN-6530) WINDPROOF & DUSTPROOF **GOGGLES**

Chamois lined, rubber covered frames. Inter-changeable, GROUND LENSES in clear or green. Has non-fogging breathers in frame. Adj. nose bar. Ideal for flying, cycling, etc. **USED 229 NEW 395**

## GO-1 GOGGLE KIT

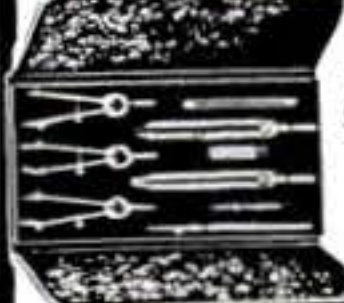


NEW! U.S. NAVY Has soft sponge rubber frame. 4 Polaroid lenses, 2 green; 1 red; 1 clear. Perfect for racing, cycling, etc. . . . . **SPECIAL 89¢**

## EYE LOUPES



An indispensable aid in fine inspection work. Available in 2 1/2, 2 3/4, 3 1/4, 4 & 5 power. each **99¢**



## 9 PIECE DRAWING SET

Suitable for the architect, student, draftsman, artist etc. Contains 9 separate pieces including: one 5 1/2" compass with pen & pencil parts; one 5 1/4" divider, one each - 3 3/4" bow divider, bow pencil & bow pen with wheel adjustment & reversible needle point; one 4 1/4" ruling pen with extra handle, capsule of extra leads. All in a 2 flap, velvet lined pocket book case. **598**

## 50 POWER POCKET MICROSCOPE

A real Palley Bargain. Extremely sharp 50 power magnification. Ideal for students, geologists, mineralogist etc. **349**

## SPECIAL VALUE 20 POWER TELESCOPE

A top quality, imported instrument. Has coated lenses ... bright, clear image and wide field of view. For all 'round use. **895**

## ORDER BY MAIL TODAY



1952 CATALOG 230 PAGES Fully Illustrated 1000's of WAR SURPLUS, Factory Close-Outs and General Merchandise Values. For the mechanic, sportsman, hobbyist, home owner, etc. BIG SAVINGS on clothing, housewares, hardware, foam rubber, hand & power tools, outdoor equipment, plastics, gadgets & a huge stock of hydraulic supplies.

Send Only 50¢ (for handling & mailing)

# SAVE UP TO 85% IN WAR SURPLUS

## AIR CORPS RUBBER BOATS

Genuine USAAF equipment and made to Gov't specifications. An ideal boat for ocean, lake or pool. Safe, lightweight and easy to pack. Thoroughly reconditioned and ready for use.

1 MAN **1895** 5 MAN **3995** 7 MAN **5995**

PADDLES **59¢** COLLAPSIBLE OARS **295 EA.** AIR PUMP **395**

## 100% WOOL FILLED SLEEPING BAG

The bag with everything you desire in comfort & convenience. Square box construction. Outer covering is vat dyed, Forest Green, combed Zelon treated, poplin, Waterproof - with heavy sateen lining. Insulated with weather-strip. Has detachable head flap and side closing. 100" Talon zipper. Double mattress pocket. Two bags may be zipped together. Overall size 36" x 80". **1950**

34.00 VALUE

## AF FLIGHT COVERALL

Lightweight, yet warm and water repellent. Has 6 convenient pockets - (2 breast pockets & 4 leg pockets) Each leg has zipper closure to permit putting on over shoes or boots. Front has zipper closure. Back is bi-swing with 1/2" belt for snug fit adjustment. Originally designed as AAF Flying Suit. Re-issue in good condition. **895**

## HUNTING KNIVES

GENUINE G.I. EQUIPMENT. Has a 6 inch, polished Vanadium blade & Handle made of leather and fibre discs. Complete with tanned leather sheath. Only **198**

## 16 POCKET VEST

The ideal jacket for the Rifleman or Hunter. . . . Has 14 individual, outside pockets for shells, glasses & other accessories. 2 large (11" x 8") inner pockets, a leather holder for knife, gun or tool. Sturdy, yet lightweight with tie-straps at back for adjustable fit. **349**

## RADIO ANTENNA REEL

For tuning beam antenna. Powered by 1/8 HP, 24V, GE motor, engaged to gear reduction only when electrical contact is made. Operated in either direction. Ideal for auxiliary power take-off 150 RPM at take-off. Used for opening & closing doors etc. A tremendous value. **875**

## ALNICO SPEAKER

Model No. S10540-2. Permanent magnet type. Sturdy die-stamped steel frame with 4 hole mounting. Requires only two wire hook-up. Makes an ideal speaker for small radios, multiple communication systems, inter office systems, test equipment, etc 4" dia. **249**

## MICROPHONE

Telephone type, highly sensitive with excellent, Clear tone. This was the Signal Corps favorite. An ideal instrument for the radio "ham" and professional recording studio, broadcasting, home recording, public address, etc. Complete with cord & plug **329**

## EXACTOR HYDRAULIC REMOTE CONTROL

MASTER & SLAVE. Consists of two units. Designed to operate controls on boats, machinery, engines, motors, etc without need for rods, cables, pulleys, etc. When connected with 1/4" tubing & filled with oil they act as a precision, remote controller. When Master handle is moved, Slave arm responds in exact motion. Range is 0 to 90 degrees. Combination Master & Slave for **4250**

## PRESSURE TANKS

G-1 - Stainless steel, shatterproof & rustless. Has reinforcing ribs & is pressure tested to 400 PSI, with high safety factor. Has 1/4" pipe ports in both ends. Ideal for use as ocean or lake buoy, underwater fishing, diving, painting, cooking or spraying. 12 1/2" x 24" ONLY **995**  
D-2 Tank- 500 cu. in. cap. **395**  
A-4 Tank- 104 cu in. cap. **195**

## 4WAY SWIVEL LAMP

Has 3 ft. flexible stand with 4 joints to adjust position. Can be used on 6-12-24-110 volts by changing the bulb. Ideal for gunsmith, workbench, desk, etc. **329**

## NAVY Sealed Beam LAMP

U S NAVY portable search-spot light. Has pistol grip and aiming sight. Makes an ideal search, spot or emergency light for auto, boat, etc. 12V. light - 4" lens ... **429**  
24V light - 4" lens ... **479**  
Set of 3 filters - red, green, amber (specify type lamp) . . . . . **99¢**

## DOUBLE TRIGGER SIGNAL LAMP

Has interchangeable, colored filters and controlled, directional beam. The 4" parabolic, Pyrex mirror reflector is movable by trigger in handle. Other trigger is off-on switch. Lamp housing is all metal with crackle finish. Kit comes complete with extra Red and Violet filters, 2 bulbs, 25 feet of cord, all in handy wooden carrying case. Operates on 12V-DC **595**

# SWIMMING BARGAINS

## NEW SELF CONTAINED DIVING UNIT

Enjoy freedom of breathing & movement under water. Has self-operating, rust-proof regulator & outlet valve. 480 cu. in. compressed air cylinder allows 1/2 hour underwater. Has perfected mouth-piece, 2 flexible hoses to regulator & free-movement harness. Standard equip. with Navy. **9975**

DeLUXE Navy MODEL - 2 hour diving time. **24950**

## "ARBALETE" SPEAR GUNS

Most efficient underwater gun made. Powerful, accurate, silent. Uses "crossbow" principle. Rubber powered. Has safety catch and will float when spear is released. Range 14 ft. **2495**

DeLUXE MODEL - Range 20 ft. 2 sets of elastics **3495**

## SNORKLE Breathing TUBES

Plastic with rubber mouthpiece. Allows breathing while eyes are underwater. Straight type \$1.95  
CURVED TYPE - Has automatic seal when immersed \$2.95

## SWIM FLIPPERS

Top quality rubber. Has pebble tread bottom. Adjustable heel strap. **795**  
Sizes: Small, Med Large

## DIVING MASK

Soft rubber mask fits over eyes. Heavy duty glass shield. Adj. headband. Jr. 4 1/2" **259** Miss 5" **269** Mr. 5 1/2" **395**

## FLOATING KNIVES

Handy for use above & under water. Will float. Cannot be lost. Fine quality steel blade. Flat Blade (A) **450** (B) Dagger **495**

## NAVY WADING SUIT

Makes surf and stream fishing a pleasure! Ideal for ranchers, oil fields or any use where necessary to protect body or clothes from moisture, silt, muck etc. Made of rubberized canvas. Has vulcanized seams, built-in rubber gloves and boots. Sizes: Small, Med., Large. **795**

CONVERTED MODEL - Same as above - Converted to waist length with bib & suspenders. **995**

## NYLON FISHLINE

STRONG - LIGHTWEIGHT - NYLON FISHING LINE. ROT-PROOF and WATERPROOF . . .

1500 ft.	10 lb.	Test	\$1.59
1000 ft.	25 lb.	"	\$1.80
750 ft.	45 lb.	"	\$3.29
750 ft.	50 lb.	"	\$3.50
300 ft.	72 lb.	Braided	\$3.79

## 7 x 35 BINOCULARS

The Very POPULAR CENTER FOCUS Model with Coated, Achromatic Lenses. Combines higher resolving power with extreme image brightness and amazing clarity. An IDEAL GLASS FOR ALL AROUND USE DAY or NIGHT! Has Lightweight, Precision made, Aluminum housing. Field of view is approx., 375 feet at 1000 yds. Complete with Leather Carrying Case and Neck Straps **4795** (PLUS FERTAX)

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## How New A-Bombs Are Tested Safely

[Continued from page 103]

dozens of planes that track and probe the cloud after each atomic test are directed, and the site of the master control panel from which instruments throughout the proving ground are operated.

About a fourth of the information that the weapon designers are seeking in the Nevada desert can only be obtained in the fraction of a minute before the bomb bursts, and the other three-fourths can only be gotten within seconds afterwards. So the observations that count are not those of men standing near the control point, but those of instruments miles away from them, which react within millionths of a second.

Many of these amazing devices are mounted in little cabins on top of towers much closer to the target than men have been allowed to venture. These towers are linked by coaxial cables to steel and concrete shelters deep in the sandy desert. In these shelters there are photographic and electronic devices to record the readings of the tower instruments up to the very instant that they are damaged or vaporized.

### *Just a Cozy Workshop*

To enter one of these dugouts, you descend a long ramp under a black dome on the desert floor. You then turn left through a doorway such as you might find in a battleship's bulkhead, proceed down a long, cool corridor, turn right through another massive, lead-lined door, and find yourself in a cozy little workshop.

It is an air-conditioned haven, where one might (but no one has) putter safely at a workbench throughout an atomic explosion directly overhead. To 99.9 percent of the world's people, the pictures and figures that come out of the devices in these costly underground darkrooms would be utterly worthless, but a scientist armed with them may someday hit a jack pot. For these bits of film and paper bear top secrets. Already they are helping the physicists at Los Alamos and the engineers at Sandia, N. M., make atomic weapons more effective.

### *Easy, He Says*

It is easy, Director Norris Bradbury of the Los Alamos Laboratory told the first reporters admitted to the Nevada Proving Ground this spring, to set off an atomic explosion. You need only put together enough fissionable material in a way that

will sustain a chain reaction. However, you might not accomplish anything more noteworthy than killing yourself.

Gadgetry is essential to the production of an efficient weapon—and even the nation's best scientists, aided by the finest electronic calculating machines, cannot predict with sufficient accuracy how some of the atomic gadgets that are now being made will perform. This often has to be learned the hard way, by detonating such weapons.

### *Efficiency Is What Counts*

Until recently, atomic weapons were considered suitable for use only against enormous, strategic targets such as oil refineries or gigantic industrial plants. But now a whole family of atomic weapons, suitable for many different purposes, is being developed. If war comes, the men responsible for America's defenses believe that atomic devices can be used as tactical weapons against targets quite close to our own troops.

These men maintain that the number of atomic bombs a nation has is no longer an index of its strength. They assert that the efficiency with which fissionable material is consumed in those weapons, and the variety of ways in which atomic weapons can be hurled at an enemy, are also important factors.

### *They Saw It and Lived*

In Nevada, for the first time, men have looked directly up into the mushroom cloud left by an atomic fireball and lived to tell about it. These men were still alive because they had crouched in foxholes, about five feet deep, at safe distances from the actual explosion.

They spoke hoarsely at first, because their mouths were full of the dust that the blast had raised around them. As they raised their heads and climbed out of their shallow holes, the wind carried the gigantic cloud right over them. It was so high in the sky by then that an ice cap was forming on top of it. And, incredible as it may seem, the hundreds of men who looked up into the interior of that dome-shaped cloud reported that it seemed to have a silver lining. END

***Next Month: PSM will tell you about the world's fastest merry-go-round, built by the Navy to learn how men can fly—and live—in the super supersonic planes that are coming.***

**BUY DIRECT - MASTER MECHANIC - UP TO 85% DISC.**



**Portable LIGHT PLANT**

**PUSH BUTTON START**  
500-700 watts 110-120 v. — 60 cyc. A.C. Powered by a sturdy dependable, easy starting, air cooled 1 3/4 hp. gas engine. No wiring necessary, just plug in and operate. Plenty of current for any oil burner, freezer, brooder, pump, emergency lights, etc. which require up to 700 watts. Ideal for Civil Defense, Fire Depts; trailers & camps. Complete with Voltmeter and built-in winding to charge 6 v. auto batteries. Wt. 85 lbs. Fully guaranteed. Be prepared if war or storm knocks out power lines.

(Item 24) etc. which require up to 700 watts. Ideal for Civil Defense, Fire Depts; trailers & camps. Complete with Voltmeter and built-in winding to charge 6 v. auto batteries. Wt. 85 lbs. Fully guaranteed. Be prepared if war or storm knocks out power lines.  
Reg. \$275.00 value. . . . . **\$143.50**  
700-800 Watt Plant (Item 44) Same as above but greater output. **\$169.95**  
1000-1200 Watt Plant (Item 45) same as Item 24, but larger generator & engine. . . . . **\$199.50**

**GIANT 2000-2500 WATT PLANT**

(Item 31) 110-120 V. 60 cyc., A.C. Absolutely the best made—exclusive dynamically balanced armature; heavy windings develop up to 5000 watt overload for motor starting. Skid-mounted — portable. Powered by easy starting Briggs or 6 hp. Wisconsin engine—complete with all accessories; engine easily disconnected for other uses. Big outlet box, voltmeter, no wiring necessary. Ample current for all purposes. Factory warranty and instructions included. Wt. 220 lbs. Reg. \$585.00. Special at. . . **\$299.50**

With Electric Self Starter (Item 179) **\$359.50**

**GENERATOR ONLY** and control box. **\$169.50**

Drive it with your engine or tractor. . . . . **\$169.50**

**TRANSFORMERS**—(Item 197) Convert 110 v. A.C. to 220 v. Capacity 2 kva. Simple hook-up. Regularly \$55. Our price—when purchased with light plant. . . . . **\$27.50**

Purchased separately \$34.50.

**3000-3500 WATT PLANT**

(Item 198) 110-220 v.—60 cyc. A.C. with Wis. Engine, push button start. **\$399.50**

Generator only for belt drive, **\$239.50**

Wt. 115 lbs. (Item 198A) . . . . .

**HI-LINE 6000 WATT PLANT**

(Item 162) Push Button Start, 115-230 v. 60 cycle A. C. A brute of a power plant with a rugged 13 hp. Wisconsin engine. Plenty of electricity for ranges, water heaters, freezers, pumps, machinery, etc. Affords both 110 and 220 volts. Ideal where heavy current is needed. Wt. 590 lbs. Easily worth \$995.00. With self starter. **\$645.00**

Factory Spec. **\$645.00**

Generator and control box only, belt driven. Use your engine or tractor. **\$345.00**

Wt. 240 lbs. . . . . **\$345.00**

Buy Wholesale—Direct From Factory—World's Largest Direct Sellers of Light Plants.

You can pay more — but you can't buy better

**STANDBY POWER CONTROL**

(Item 207) For hospitals, radio stations, fire depts., etc. Automatically starts light plant when power fails. Available for all our plants. From **\$59.50 to \$99.50.**

**MASTER AIR COMPRESSOR**

(Item 209) High pressure type for large volume of air for heavy duty service. For paint spraying, inflating truck and auto tires, greasing, and the hundreds of other jobs done by compressed air. Piston type, 2"x2" compressor with built-in air filter, master built with hi-strength alloys and precision bearings. Stainless steel tank, 12" x 24", 2100 cu. in. cap. Safe up to 500 lbs. Equipped with automatic switch that starts and stops motor to maintain desired pressure (up to 150 lbs.) and check valve, safety valve, gauge, shut-off valve, 20 ft. air hose and tire chuck. Beautifully balanced on ball bearing wheels and rubber tires. Note low factory prices.

With 1/3 hp 110 v. A.C. motor (Reg. \$175.00) (Item 209) . . . . . **\$98.50**

With 1/2 hp motor (Reg. \$199.50) (Item 209A) . . . . . **\$119.50**

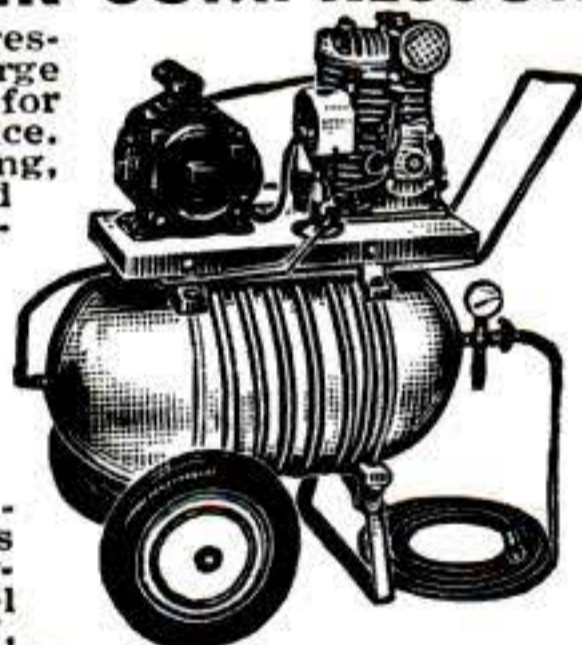
With 2 hp Briggs Gas Engine (Reg. \$199.50) (Item 209B) . . . . . **\$109.50**

Compressor only (2"x1 3/4") (top quality) (Item 209C) . . . . . **\$20.50**

Larger Compressor (2"x2") (none better) (Item 209D) . . . . . **\$24.50**

Giant Compressor (twin 2 1/2"x2") (Item 209E) . . . . . **\$54.50**

A complete line of spray guns and air tanks available at factory prices.



**IMMEDIATE DELIVERY—ALL ITEMS**

**HEAVY DUTY D-C ARC WELDER**



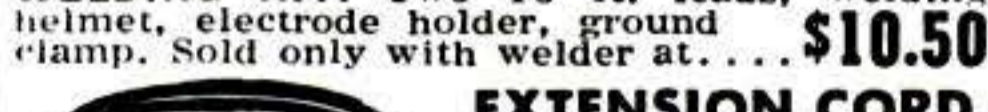
(Item 38)

Use as portable or shop welder. Up to 300 amps. Senior model. Made for years of trouble-free, continuous service. Will handle light or heavy jobs. Easily welds up to 3/4" plate using 1/4" rods. Built-in air-cooling system. Arc is easy to strike and hold, because of specially designed arc stabilizer. Hi-lo switch and dial control gives wide range of welding heats. Run welder at 2600 rpm. with tractor, jeep or 15 hp. gas engine, or 7 hp. elec. motor. Complete with instructions, guar. and double V belt or flat pulley. You can pay more, but you can't buy a better welder. Wt. 110 lbs. \$400 value at. . . **\$99.75**

**DUAL CONTROL MODEL** same as above but with built-in dual rheostat for low heat soldering, brazing, welding. Spec. **\$119.50**

**WELDING KIT.** Two 10 ft. leads, welding helmet, electrode holder, ground clamp. Sold only with welder at. . . . **\$10.50**

**EXTENSION CORD**



(Item 16) 40 ft. heavy duty, made of specially insulated No. 14 2-conductor wire. So tough that you can drive over it and yet flexible and easy to handle. Resists oil, grease or water. Extends electricity up to 400 ft. without voltage drop. Use indoors or out. Complete with heavy rubber plug and outlet. Wt. 2 1/2 lbs. Usually \$4.50—Special 40 ft. **\$1.99**

Comb: 2-40 ft. and 1-20 ft. (total 100 ft.) **\$4.95**

100 foot length (one piece) . . . . . **\$4.85**

**WIRE ONLY** (Item 50) No fittings, 100 ft. **\$4.00**

**HEAVY DUTY POWER CABLE**

#12—2 Cond.—stranded, very flexible, rubber covered, special outside conductor for grounding power tools, etc. Finest heavy duty power cable made. U.S. Surplus.

50 ft. (Wt. 8 lbs.) Item 199 . . . . . **\$6.95**

100 ft. (Wt. 16 lbs.) Item 200 . . . . . **\$12.95**

**Variable Speed Selector**

Heavy duty, made by B. F. GOODRICH for industrial use. Provides instant speed changes for any drive. For machine tools, dryers, printing, conveyors, production lines, hoists—any operation requiring variable speed. Ideal for midget autos. Employs reliable "trouble free" planetary system. No hydraulic power losses or creeping. Infinite range, smooth operation, easy installation. 3 sizes: 1/2-1 hp. wt. 36 lbs.; 1-2 hp. wt. 55 lbs.; 2-3 hp. wt. 105 lbs. Reg. list \$228, \$252 and \$352. Brand new, in Goodrich boxes and guaranteed. Complete installation data included. Unprecedented surplus sacrifice **\$79.50, \$89.50 and \$114.50.**



(Item 68)

**POTTERS WHEEL**

(Item 47) Complete prof. equip. for making finest ceramics and pottery. New design, larger, non-breakable, Alomite bearings. Large dynamically balanced cast-aluminum reversible turntable with variable speed drive (38 to 140 rpm) controlled by foot-pedal. Built-in adjustable arm rests, water cup and wedging wire. 18x18" enclosed throwing table—ample area for largest pieces. Req. 1/4 hp. motor (not incl.). Complete with pulleys, belts and instructions. Wt. 26 lbs. **\$59.95**

Westinghouse 1/4 h.p. motor for above. Wt. 27 lbs.—Item 47A . . . . . **\$19.50**

**DUAL TUBE LIFE SAVERS**

(Item 54) NEW APPROVED TYPE made by Genl. Tire for Navy. Each has 2 rubber tubes for double protection. Easily inflated by mouth to 55 in. Wear one around waist as comfortable life saver. Adjustable safety buckles fit adults or children. Tie several together for raft or big luxurious mattress. Invaluable on boats or beach. Wt. 2 lbs. each. Our spec. (a fraction of cost) 99c each, 6 for. . . **\$5**

**MALL ELECTRIC CHAIN SAWS**

Amazing labor saver. Fells and cuts up 36" trees in minutes. Wonderful for pruning and trimming. Use portable light plant for power. Item 202, 12" Saw Wt. 12 lbs. . . . . **\$115.00**

Item 203, 18" Saw Wt. 20 lbs. . . . . **\$130.00**

**SAVE ON CATALOG ITEMS**

We have hundreds of bargains. Send 10c for catalog for information on following items: Trouble Lights, Air Tanks, Fire Extinguishers, Electric Hot Water Htrs., Rubber Hose, Electric Tools, A.C. Arc Welders, Sleeping Bags and many, many other useful articles.

**MASTER GARDENER \$119.50**

It's a lawn mower  
It's a power sickle  
It's a cultivator

It's a plow  
It's a Snow Blow  
It's a rotary tiller  
It's a bulldozer



Here at last is a power unit that does everything at a price that can't be matched. Built-in power takeoff to drive pumps, saws, generators, etc. Safety clutch—can't burn out. More versatile and efficient than tractors costing twice as much. Basic self propelled 2hp tractor with Briggs or Clinton famous engine. **\$119.50**

Quickly converts your hand mower to power

Item 206

Rotary tiller. . . . . **\$42.50**

Plow. . . . . **\$15.00**

Sickle Bar-Mower. . . . . **\$42.50**

Cultivator . . . . . **\$ 8.75**

Bulldozer . . . . . **\$11.25**

Weeder (2-shovel) . . . . . **\$15.00**

Lawn mower hitch (Utilizes any hand mower) . . . . . **\$ 4.50**

Snow Blow . . . . . **\$29.50**

Freight prepaid to most areas. Easy payment plan available.

**COMMANDO BIKE MOTOR**

(Item 90)

New, super-modern 1952 model. This job is the Cadillac of all bike motors. Sensational Auto-Clutch prevents killing motor at each stop. Also selects proper ratio on hills. Mounts behind and drives rear wheel with Dynarotor. Free Wheeling lever permits pedalling if desired. Rear Mounting eliminates fumes, heat, dirt, and hard steering. Easily installed in 15 minutes with home tools. Sturdy, trouble-free, easy starting, light weight. Airplane type engine; up to 150 miles per gallon. Fully guaranteed for fun or profit. Ideal for deliveries, paper routes, messenger service, etc. Ride to work and save. Dealer inquiries invited.

The Commando Captain. **\$99.75**

1 cylinder 1 1/2 hp. . . . . **\$125.00**

The Commando General. **\$125.00**

2 cylinder 3 hp. (Item 91) . . . . . **\$125.00**

All Commandos shipped prepaid in U.S.

**32 pc. SOCKET SET**

32-pc. Socket Set (Item 59) Highest quality guar. non-breakable sockets made by Husky. Beautiful, matched chrome alloy, absolutely the best. Complete range of 21 sockets from 1/4" thru 7/16" in 1/4" drive and 7/16" thru 1-1/16" in 1/2" drive; 2 extensions, reversible 1/2" ratchet, adaptor bit, slide head, all angle coupling, 2 end wrenches, 1/4" speeder handle and sturdy metal tool box. For prof. mechanics who want the best. Wt. 11 lbs. **\$16.95**

Easily worth \$41.50. While they last. **\$16.95**

**45 pc. SOCKET SET**

(Item 205) Contains a complete set of sockets in 1/2" drive, 3/8" drive and 1/4" drive, plus all necessary extensions, handles, speeders, reversible ratchets, etc.; all uncond. guaranteed against breakage. Beautiful matched chromed thin wall alloy sockets in a sturdy handsome steel tool box. Wt. 17 lbs. **\$26.95**

List Price \$62.90. Factory Special. . . . . **\$26.95**

**3/8" DRIVE 15 Pc. SOCKET SET**

(Item 201) Same top qual. as above—includes 7 sockets 3/8" thru 3/4", reversible ratchet, extension, flex. handle, cross bar, 3 punches, metal tool box. Wt. 5 lbs. **\$9.95**

List Price \$18.96. Our Spec. . . . . **\$9.95**

**HYDRAULIC JACKS**

(Item 208) Heavy duty, precision built, smooth, positive acting with built-in relief valve. Hi-Lift with screw extensions. Govt. surplus at a fraction of orig. cost. (Handle included.)

1 1/2 ton (Item 208) **\$6.45**

Wt. 11 lbs. . . . . **\$9.45**

3 ton (Item 208A) **\$9.45**

Wt. 15 lbs. . . . . **\$11.45**

5 ton (Item 208B) **\$11.45**

Wt. 17 lbs. . . . . **\$11.45**

**HEATING & VENTILATING FAN**

(Item 10) Easily installed in furnace pipes. Forces even heat to all rooms. Over range, removes kitchen smoke and odors. Powerful continuous duty motor, 110-120 v. A.C. Quiet, super efficient fan moves huge volume of air (400 to 600 c.f.m.)

8" Fan, wt. 5 lb. **\$6.35**; 9" Fan, wt. 6 lbs. **\$7.45**;

10" Fan, wt. 7 lb. **\$8.45**; 12" Fan, wt. 8 lbs. **\$9.45**.

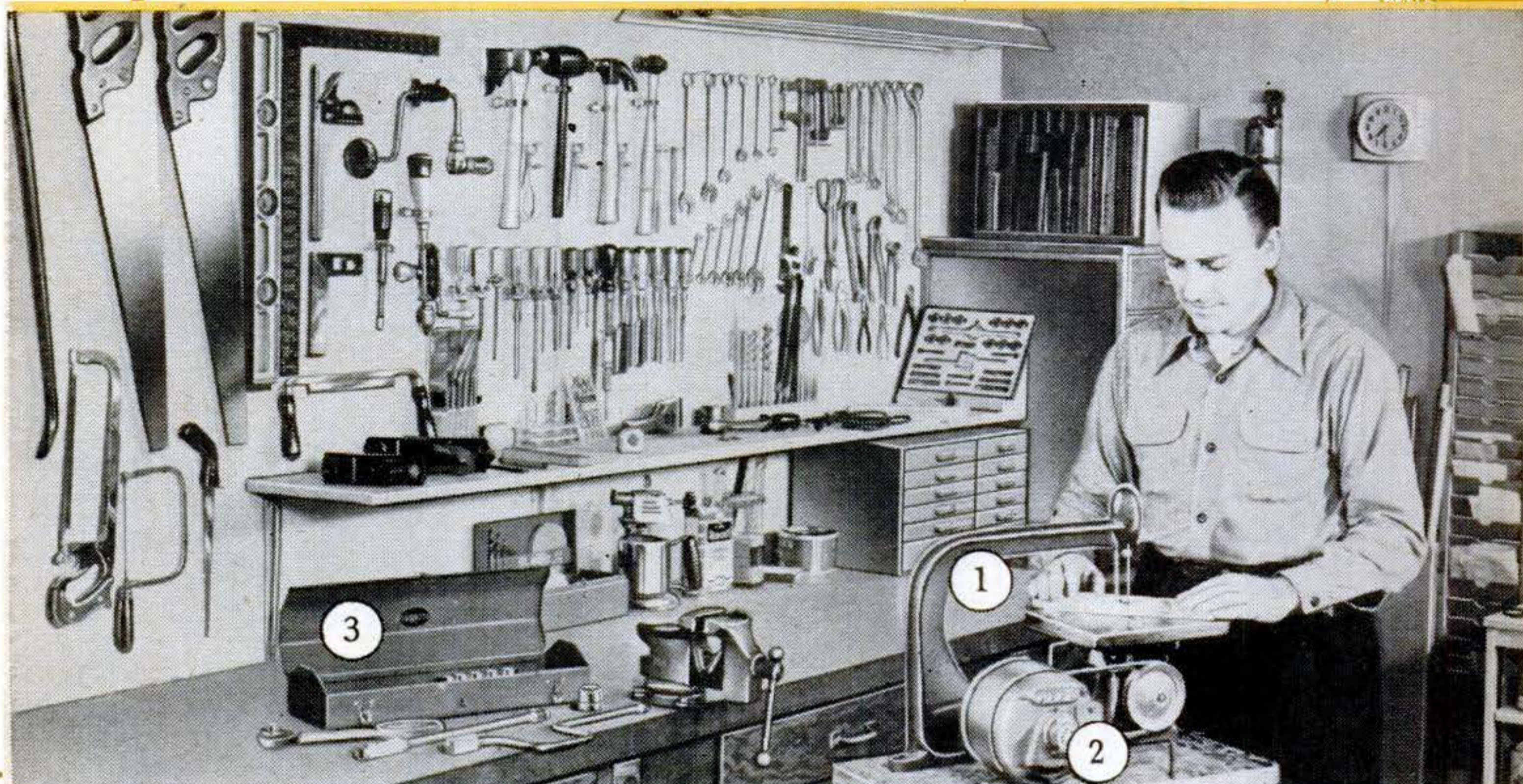
Heavy-duty 12" fan, enclosed motor, suitable for spray booths, restaurant exhausts, poultry houses, and other difficult applications. Wt. 12 lbs. Item 10D. . . . . **\$12.65**



(Item 10D)

**All items brand new. Prices f.o.b. Chicago area. 10 day Money back guarantee. Send check or M. O. MASTER MECHANIC MFG. CO., DEPT. 74A Burlington, Wis.**

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② **1/4 HP Electric Motor**, 1725 rpm, 115 volt, 60 cycle AC. Split phase. GE guaranteed for 1 year. Use with jig saw, washer, churn, paint sprayer, etc. . . . (2H1600) **\$16<sup>95</sup>**

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**Screwdriver**, alloy steel, chrome-plated. 4" sq. blade. Extra long, positive-grip handle. Professional quality. Yours for (HR1361) **85¢**



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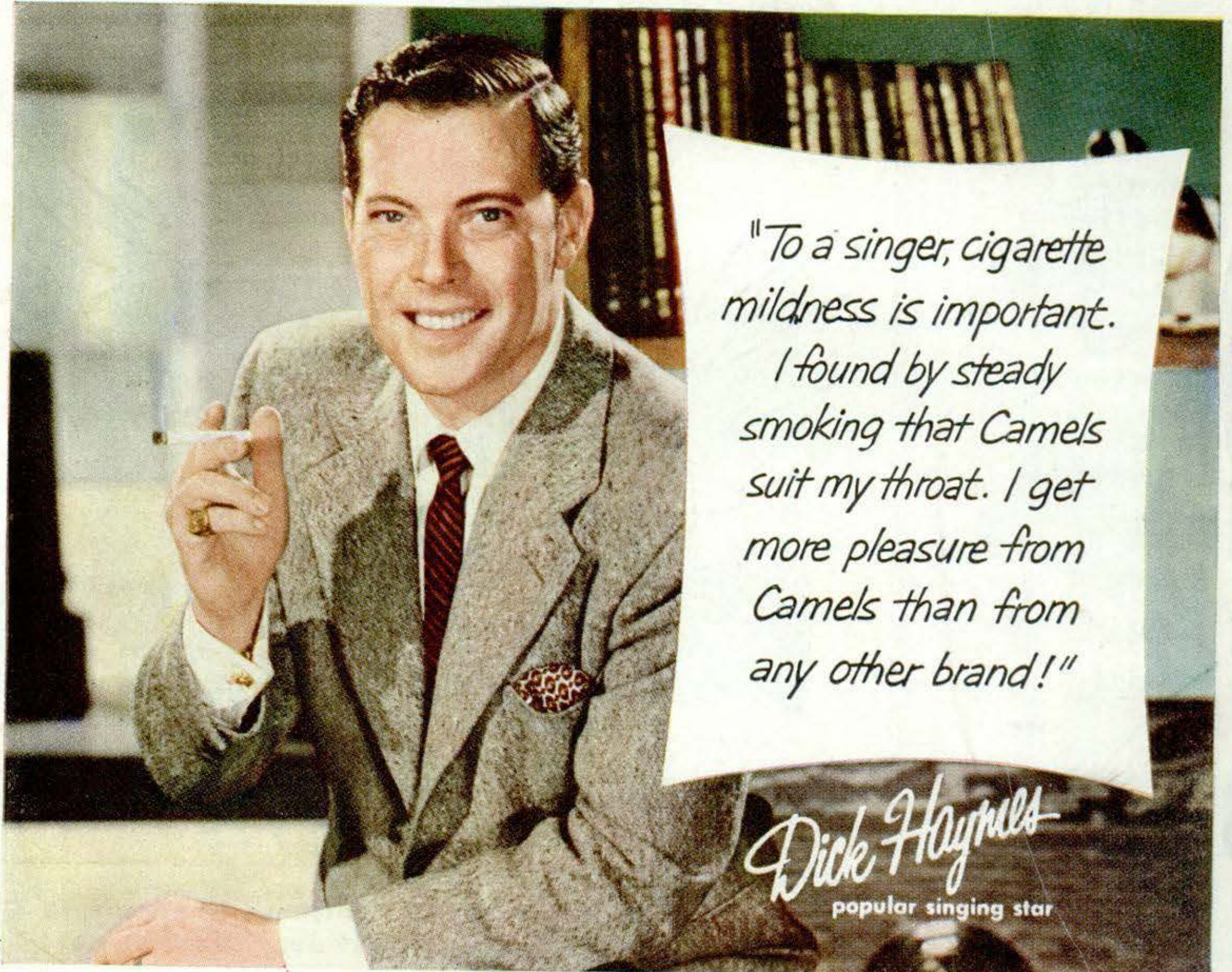
**MAKE** \_\_\_\_\_ **YEAR** \_\_\_\_\_ **MODEL** \_\_\_\_\_

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